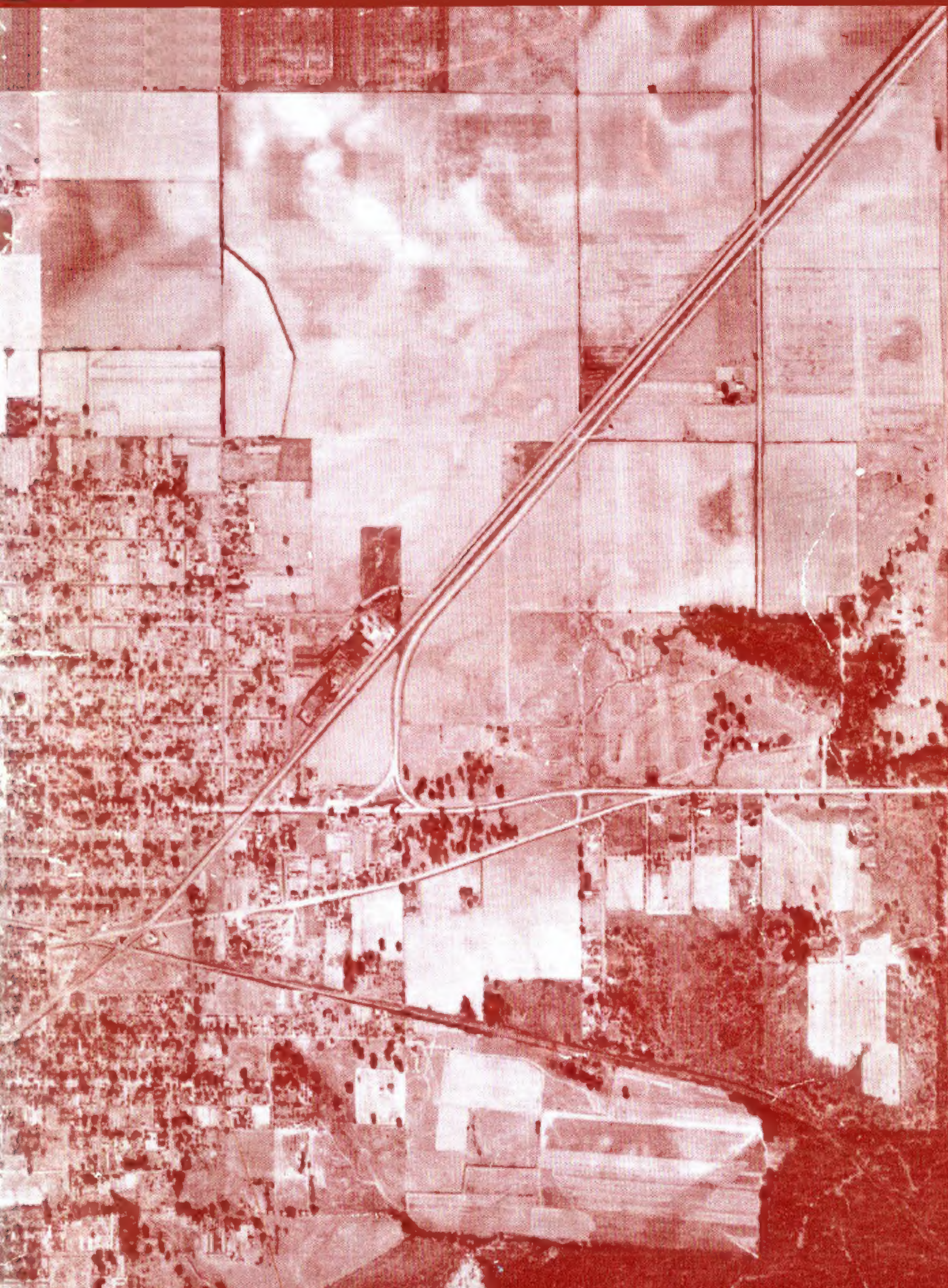
CHRISTIAN COUNTY SOILS



SOIL REPORT 73

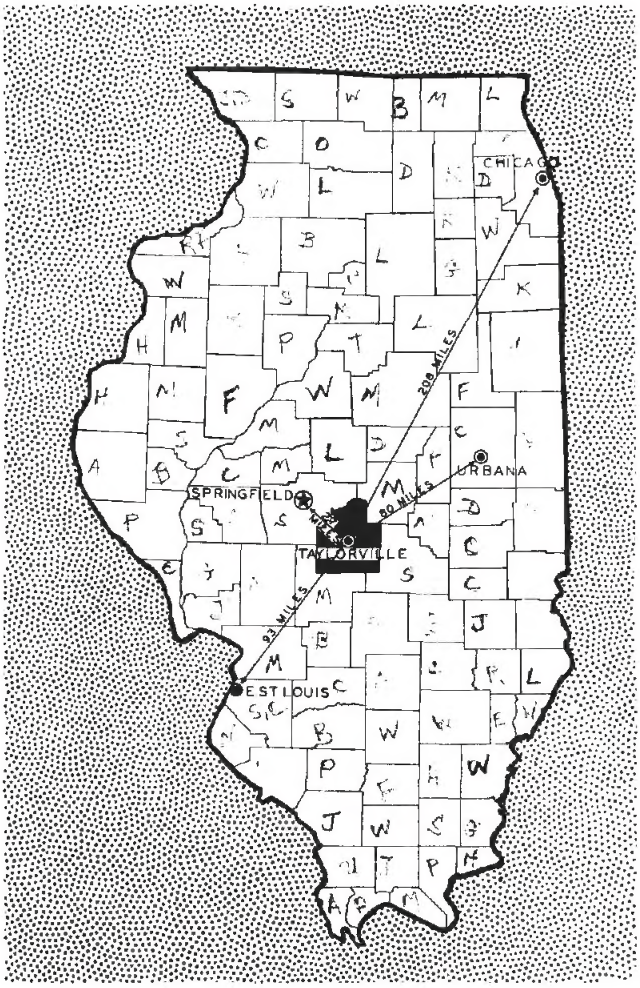
UNIVERSITY OF ILLINOIS
AGRICULTURAL EXPERIMENT STATION

COVER PICTURE

The picture on the cover of this report shows the eastern edge of Taylorville and the territory immediately to the east and northeast. Some of the meanders of South Fork Sangamon river appear in the lower right-hand corner. The light spot in the bottomland south of town is a swampy ponded depression.

Of special interest are the shaded areas in the northeastern part of the picture that show the intermingling of darker and lighter colored soils. The complex soil pattern shown here is characteristic of much of Christian county.

(Picture supplied by
Agricultural Adjustment Administration,
U. S. Department of Agriculture)



Christian county lies in southwest central Illinois, bordered on the north by Sangamon river. Taylorville, the county seat, is about 27 miles by highway southeast of Springfield, the capital of the state, and 80 miles southwest of Champaign-Urbana.

CONTENTS

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Urbana, Illinois August, 1950

CHRISTIAN COUNTY SOILS

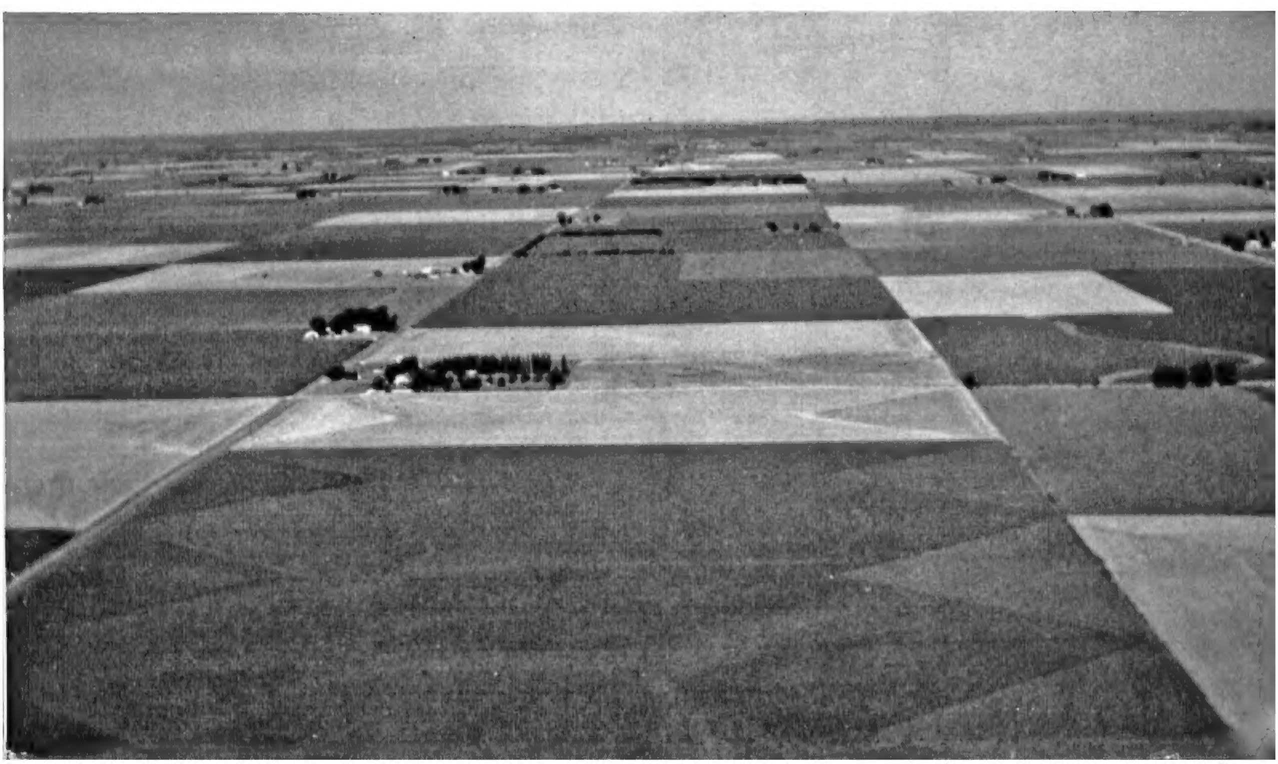
By J. B. Fehrenbacher, R. S. Smith, and R. T. Odell

THIS SOIL REPORT has been prepared primarily for the farmers of Christian county. The soil map shows the nature and the location of the various soils of the county. The text includes suggestions for the use, conservation, and management of each kind of soil shown on the soil map.

Christian county is mainly agricultural, although coal mining is an important industry. Taylorville, the county seat and the largest town, had, at the time of the 1950 Census, a population of about 10,900. In 1944 about 74 percent of the total area of the county was used for crops, 14 percent for pasture exclusive of woodland that was pastured, and 3 percent was in woodland.

This report is intended as a help in answering four major questions for the farmers of Christian county: *What soil types do I have on my farm? What treatment and management does each soil type need? What crops are adapted to each soil type? What yields may be expected on each type?*

A typical scene in northern Christian county. This airview was made looking west on the south half of Section 21, Mosquito township, about 3 miles southeast of Mount Auburn. Such nearly level to gently sloping areas characterize much of Christian county. Fig. 1



HOW TO KNOW YOUR SOILS AND PLAN THEIR MANAGEMENT

First Examine the Soil Map

Locate the area you are interested in. The soil map, included at the back of this report, consists of five sheets. The diagram on the back of each sheet shows the part of the county which that sheet covers. By noting these diagrams, you will be able to select the sheet or sheets which include the area where your farm lies.

On these sheets the area of each soil type is shown by a distinguishing color and by a number usually placed in each area. Where an area is too small to accommodate the soil number, the number is placed adjacent to the area and connected with it by a line. The map also shows the township lines and ranges, the sections with their numbers, the principal streams, roads, railroads, towns, and other cultural features.

Colors are guide to general soil conditions. The various colors on the soil map are used to distinguish the different soil types, to show the extent of each, and to indicate the general soil conditions. These general conditions are made clearer when the soil map is compared with the discussion on page 55 and with Fig. 9, page 57.

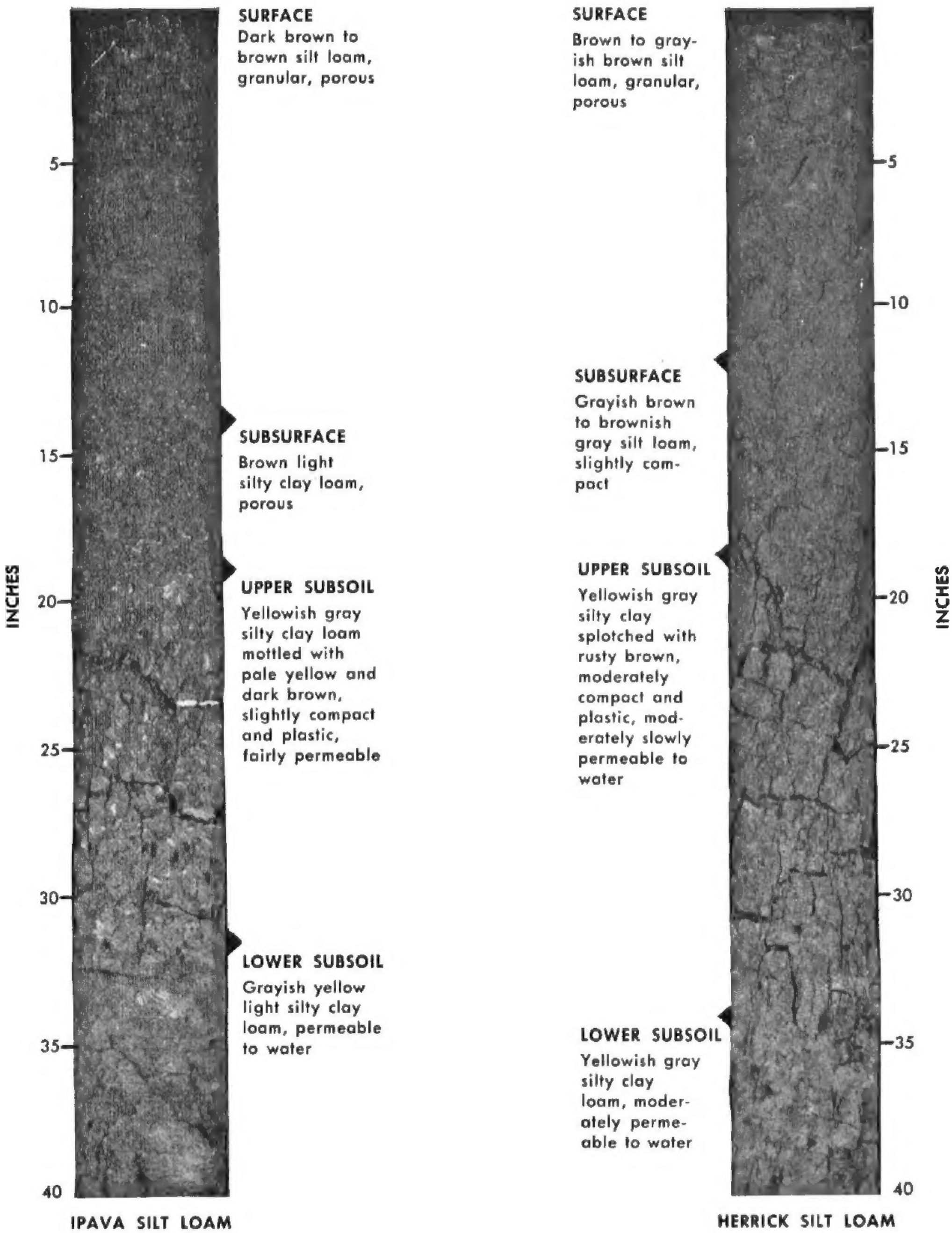
For example, various shades of *blue* are used for dark upland soils that underdrain well. These blue shades correspond with Areas 1A, 1B, and 1C in Fig. 9. Shades of *pink* are used for the dark upland soils that have a grayish cast and somewhat heavier subsoils. These pink areas correspond with Area 2 in Fig. 9. Shades of *gray* are used for the upland claypan soils in the southeastern corner of the county (Area 3 in Fig. 9). The light-colored timbered soils in Areas 1, 2, and 3 are indicated by various shades of yellow. Shades of green are used for the dark terrace and bottomland soils (Area 4, Fig. 9).

Note names of soil types. Within or near the color for each soil, as mentioned above, is the number or letter for that soil type, the names of the types being given on each map sheet.

For a complete numerical list of soil types see the tables on pages 8, 15, and 50-51. The table on pages 50-51 gives an index to the pages where the various soil types are described and their use and management discussed. For an alphabetical list of types and a page index to their discussion see page 63.

Study your soil types. After finding out which soil types occur on your farm, turn to the soil-type descriptions, mentioned above, and read what is said about each of the soils you have. Note that some of the soils are very similar and that others are markedly different. Differences that may seem unimportant may take on increased importance as they are better understood. Soils are complex, and there is much yet to be learned about the best way to fertilize and manage each kind. Each landowner and operator can get a better understanding of the problems that arise by studying the soils he is working with.

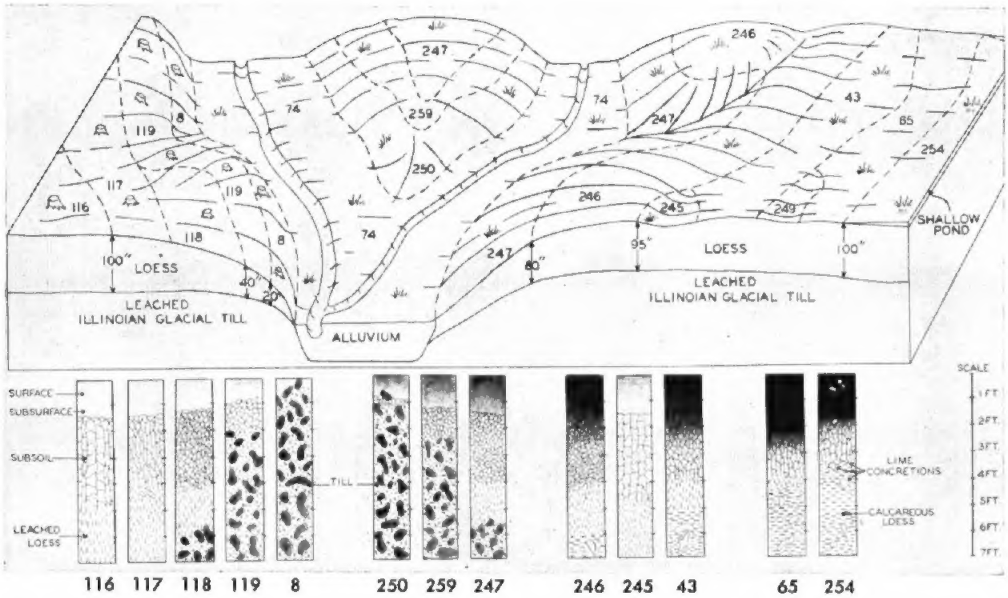
Entire soil profile is important. Soils are separated into types on the basis of the character of the soil profile to a depth of 40 inches or more. It happens frequently that the surface horizon, or layer, of one type is little or no different from that of another, and yet the two soils may differ widely in the character of the subsurface and subsoil and hence will differ in agricultural value and in management requirements.



PROFILES OF TWO SOILS SHOWING CONTRAST IN STRUCTURE

In Ipava silt loam note the deep dark surface stratum with its granular structure. The few cracks in the subsoil indicate a moderate clay content.

In Herrick silt loam the surface soil has a grayish cast and is granular. The numerous shrinkage cracks in the subsoil indicate its high clay content. Fig. 2



Type No.	Type name	Percent slope	Type No.	Type name	Percent slope
116	Whitson silt loam	0.5-1.5	247	Tovey silt loam	3.5-7
117	Bogota silt loam	1.5-3.5	246	Bolivia silt loam	1.5-3.5
118	Alma silt loam	3.5-7	245	Denny silt loam	0-0.5
119	Elco silt loam	7-15	43	Ipava silt loam	0.5-1.5
8	Hickory gravelly loam	Over 15	65	Illiopolis silty clay loam	0-0.5
250	Velma loam	7-15	254	Hartsburg silty clay loam	0-0.5
259	Assumption silt loam	5-10			

EFFECT OF TOPOGRAPHY AND NATIVE VEGETATION ON SOIL

The upper part of the above diagram shows how five timber soils (extreme left) and eight prairie soils in the north half of Christian county are located with reference to topography, or the lay of the land. Tree stumps indicate where timber once grew; clumps of grass, where grasses grew; and grasses with shadings below (at the extreme right) indicate standing water, or ponds. Many of the flats and depressions that were once ponded have been artificially drained.

The diagram as a whole shows how the native vegetation that once covered these areas has influenced the characteristics of the various soils, especially the amount of organic matter in the surface soil, which is indicated by the lighter and darker shadings at the top of the panels — the darker the shading the more organic matter.

The panels in the foreground show the general structure of the different soil layers of each type and the arrangement (structure) of the soil particles in the subsoil. The average depth to which lime has been leached out is shown by the depth to lime concretions and calcareous loess (for key to symbols see panel on the extreme right).

Most of the soils in Christian county were formed from loess. However, on the steeper slopes, as on Types 8 and 250, for example, all or nearly all of this loess has been eroded away, exposing the underlying highly weathered till, which is of little agricultural value.

Fig. 3

It is of utmost importance, therefore, in studying soils, to get a clear mental picture of the features of each soil, including all the various horizons, or layers, exposed when you dig down into the soil for 40 inches or more.

Fig. 2 shows two soils, Herrick silt loam and Ipava silt loam, to a depth of 40 inches. The surface horizons of these two types are very difficult to distinguish when both are moist; when they become dry, the surface of Herrick has a much grayer cast than Ipava. The outstanding and agriculturally significant differences between these two soils cannot be seen except by exposing the underlying layers. The subsoil of Ipava appears to be permeable to both water and roots, whereas the well-developed blocky appearance of the Herrick subsoil at once makes one wonder whether this soil will underdrain freely. The Herrick subsoil is much nearer a claypan condition, sometimes called "hardpan," than is the Ipava subsoil, and therefore is more resistant to the penetration of moisture and roots.

Variations occur within each type. It is likewise important to understand that a given soil includes a range in characteristics and in properties. The boundaries between soil types vary in sharpness. Between most adjacent soils there is a zone that includes some of the characteristics of each type. Also, within a given type there often are areas of other types too small to be shown on the soil map, or sometimes types are so intermingled that it is impossible to show them separately. Onarga fine sandy loam and Hagener loamy fine sand are two such intermingled types in Christian county. They are indicated in the descriptions as "undifferentiated." These variations within soil types make it necessary for a landowner or operator to study his soils in addition to studying the soil map and the soil descriptions.

The nature of soil types is not a matter of chance. Their character is determined by a number of factors, as explained on pages 52 to 55. The situations in which the important upland soil types in the northern part of Christian county occur are shown in Fig. 3. Although each type is found on areas limited to certain degrees of slope, more than one type may occur within any one slope range. Differences in natural drainage, parent material, or native vegetation have caused different types to develop.

Compare Your Yields With Test Yields

Use five-year averages. In Illinois high crop yields year after year are the result of good soil and good management. Low yields may be caused by a poor soil, or by trying to grow crops that are not adapted to the soil, or by faulty management.

Table 1 shows what yields can reasonably be expected from Christian county soils, as an average, over a period of years under good soil management.[1] If you find that your average yields for five years or longer are much below those shown in Table 1 for your soil types, it will pay you to examine your management practices to see where changes should be made. A minimum of

[1] Anyone interested in land as an investment should realize that crop yields alone are not necessarily a true index to land values, for the operating costs necessary to get good yields vary from one soil type to another. In general, the lower the yields, the more difficult and more costly it is to apply good management practices. On some soils that produce only medium or low yields, good management is rarely found except where the owner himself operates the farm.

Table 1. — CHRISTIAN COUNTY SOILS

Average Yields To Be Expected Over a Period of Years Under Good Management[a, b]

Figures in **bold face** are based on long-time records kept by farmers in cooperation with the Department of Agricultural Economics; the others are estimated yields. *All yields were obtained without the use of soluble fertilizers.*

Type No.	Type name	Hybrid corn	Wheat	Oats	Soy-beans	Alfalfa	Bluegrass pasture[c]
		bu.	*bu.*	*bu.*	*bu.*	*tons*	*days*
8	Hickory gravelly loam	N	N	N	N	N	30
13	Bluford silt loam	40	20	33	18	1.9	50
14	Ava silt loam	39(E)	19(E)	31(E)	17(E)	2.0	50
43	Ipava silt loam	**68**	**26**	**50**	**28**	**2.7**	90
46	Herrick silt loam	**60**	**25**	**44**	**25**	**2.4**	80
48	Ebbert silt loam	53	23	39	24	1.7	70
50	Virden silty clay loam	**63**	**24**	**43**	**26**	**2.1**	80
65	Illiopolis silty clay loam	**66**	**25**	**48**	**28**	**2.3**	90
72	Sharon loam, bottom	51(D)	22(D)	36(D)	23(D)	2.0(D)	80
74	Radford silt loam, bottom	56(D)	22(D)	40(D)	24(D)	2.1(D)	90
80	Alexis silt loam, terrace	58(E)	23(E)	41(E)	23(E)	2.4	70
81	Littleton silt loam, terrace	66	25	47	26	2.7	90
87	Sumner sandy loam, terrace	**45**	**18**	**35**	**16**	**1.9**	50
99	Vance silt loam, rolling phase	N	N	N	N	2.0	40
102	LaHogue loam	52	22	40	22	2.2	70
107	Sawmill clay loam, bottom	60(D)	22(D)	37(D)	25(D)	N	80
112	Cowden silt loam	**49**	**22**	**36**	**22**	**2.0**	70
113	Oconee silt loam	**49**	**23**	**38**	**21**(E)	**2.3**	70
116	Whitson silt loam	43	19	34	20	1.6	50
117	Bogota silt loam	47	**22**	38	21	2.2	60
118	Alma silt loam	45(E)	21(E)	36(E)	19(E)	2.1	60
119	Elco silt loam	N	N	N	N	1.8	50
120	Slick spot	25	14	22	15	N	30
127	Harrison silt loam	**57**	**24**	**42**	**24**	**2.7**	70
128	Douglas silt loam	50(E)	22(E)	39(E)	22(E)	2.3	60
134	Camden silt loam, terrace	49	21	37	20	2.1	60
135	Potomac sandy loam, terrace	40	18	30	16	1.8	30
136	Brooklyn silt loam, terrace	43	18	30	19	N	40
138	Shiloh clay loam	64	24	42	27	1.9	80
170	Breese silt loam	52	23	43	23	2.1	60
177	Orio silt loam, terrace	53	20	37	22	1.5	80
184	Roby fine sandy loam	37	17	28	15	1.7	40
186	Kincaid fine sandy loam	N	N	N	N	1.6	40
190-98	Onarga fine sandy loam—Hagener loamy fine sand, undifferentiated	45	19	35	18	2.0	40
195	Hersman clay loam, terrace	64	24	45	26	2.2	90
245	Denny silt loam (45)	47	18	34	20	N	50
246	Bolivia silt loam	**64**	**25**	**49**	**26**	**3.0**	80
247	Tovey silt loam	**60**(E)	**23**(E)	**46**(E)	**24**(E)	**2.7**	70
249	Edinburg silty clay loam	54	22	40	23	1.6	70
250	Velma loam	N	N	N	N	1.9	40
251-252	Owaneco silt loam—Harvel silty clay loam, undifferentiated	50	18	34	20	N	60
253	Stonington loam, terrace	N	N	N	N	2.0	40
254	Hartsburg silty clay loam (244)	**64**	**24**	**46**	**27**	**2.1**	80
255	Vanderville silt loam	51	23	43	23	2.4	60
256	Pana silt loam	N	N	N	N	2.1	50
257	Clarksdale silt loam	57	24	43	25	2.2	70
258	Sicily silt loam	56	24	43	24	2.6	70
259	Assumption silt loam	49(E)	21(E)	37(E)	N	2.3	60
260	Dunkel silt loam	40	17	30	18	N	40
264	Hickory sandy loam	N	N	N	N	N	N

[a] For definition of *good management* see pages 9-13.

[b] Letters in the yield columns have the following meanings: D = Yields for bottomland types, assuming less than 10 percent damage by flooding. E = Crop not adapted unless erosion-control measures are used. N = Crop not adapted.

[c] Estimated number of days one acre, without soil treatment, will carry one cow.

at least five years is necessary for a valid comparison because of the wide seasonal variations that occur in rainfall, temperature, wind, and insect and disease injury.

Still higher yields are possible. On most soils crop yields can be advanced beyond those shown in Table 1 by applying fertilizer containing nitrogen, phosphate, and potash, and even the minor elements such as boron. Soluble phosphates drilled with wheat and other small grains will increase yields in many seasons well beyond the cost of the increase. Applying mixed fertilizer for corn at planting time is recognized by progressive farmers as good practice. Thus, while yields below those shown in Table 1 usually indicate faulty management, yields higher than those shown are quite possible.

Since new crop varieties, new cultural and fertilizer practices, and new plant diseases and insect pests may change yield levels in future years, the figures in Table 1 must be regarded as mainly of current interest. Revised tables of later figures can be obtained from time to time by writing the DEPARTMENT OF AGRONOMY, AGRICULTURAL EXPERIMENT STATION, URBANA, ILLINOIS.

Know the Requirements of Good Soil Management

The basic requirements for getting the highest practicable yields from the various soils in Christian county are similar for all of them. Yet there frequently are specific management requirements for each soil type, which if neglected, result in disappointing yields. The following discussion points out the requirements that are common to *all* good soil-management programs; the use-and-management paragraphs included under the discussion of each soil type describe the special requirements of that type.

Good drainage is necessary. No poorly drained soil can be consistently productive. On some of the soils in Christian county, natural drainage is adequate. On others, tile or surface ditches — whichever are suited to the soil and slope — must be used.

Types 43, 65, 72, 74, 81, 102, 107, 195, and 254 tile satisfactorily. Types 46, 50, and 138 underdrain slowly but respond satisfactorily to tiling if the strings of tile are placed closer together than is necessary in more open soils. Types 48, 117, 170, 177, 249, 251-252, and 257 underdrain so slowly that tiling is questionable; but where tile are installed, they generally should be supplemented with surface ditches. Types 13, 112, 113, 116, 120, 136, 245, and 260 are so slowly permeable that excess water must be removed by surface ditches and furrows or by catch basins leading into a tiling system. The problem is to recognize these differences in soils and to plan a drainage system that will be effective.

Fortunately the total area of the soils in Christian county that cannot be tiled is small — only about 30,000 acres, or 6½ percent of the area of the county. Crops growing on soils that cannot be tiled are more affected by unfavorable seasonal conditions than those growing on soils that are permeable to water and roots. This effect can be lessened by properly fertilizing these soils.

Tests must be made for acidity, phosphate, and potash. The removal of crops from the land year after year and the dissolving-and-leaching action of rain finally cause soils in a humid climate to become acid and deficient in plant nutrients. Satisfactory yields cannot be produced on such soils.

Soil tests are an invaluable aid in discovering nutrient deficiencies and in indicating how much limestone, phosphate, or potash to apply in order to correct the deficiencies. It often happens that parts of a field need no limestone or fertilizer, while other parts of the same field are acid and low in phosphate or potash or both. The soil map and the soil tests together reveal these differences and make it possible to apply limestone and fertilizer where needed and in the amounts needed.

Apply limestone, phosphate, and potash where tests show need. If tests show that the soil is acid, this unfavorable condition is easily corrected by applying ground limestone. If potash is deficient, it can be supplied in a potash fertilizer.

If, however, phosphate is deficient, it is not so clear what is the best way to correct this condition. Both rock and superphosphate are on the market and are widely used in Illinois. Rock phosphate costs less per unit of phosphoric acid than does superphosphate. The cost per unit of phosphoric acid, however, does not determine the relative merits of the two phosphates. Either can be used to maintain or increase the phosphate supply in the soil. Which form, when used on the various soils of the state, will give greater returns on the money invested and still maintain the phosphate in the soil is not clearly shown by the experimental information available.

We know that there are soils in Illinois that respond remarkably to rock phosphate and others that do not. These differences will be brought out, in so far as such information is available, in the use-and-management paragraphs in the descriptions of the soil types, pages 16 to 49. The role and the importance of phosphate are explained in Illinois Bulletin 484, "The Problem of Phosphate Fertilizers."[1]

Organic matter and nitrogen require special attention. Adequate supplies of nitrogen and decaying organic matter in the soil are necessary in order to obtain vigorous crop growth and maximum productivity (see Table 2). Unlike phosphorus and potash, nitrogen is not a constituent of the soil minerals — it comes largely from leguminous organic matter. It is therefore important to grow crops that will leave in the soil a good supply of organic matter high in nitrogen.

Nitrogen can be purchased in mixed fertilizer and, as many farmers have found from their own experience, can be used at a profit during periods of high grain prices. In general, however, it is better to supply most of the nitrogen needed for the grain crops by growing legumes, since nitrogen in mixed fertilizer is expensive and decaying organic matter is necessary in order to keep the soil in good physical condition.

Such soils as Types 50, 65, 107, 138, 195, 249, and 254 are likely to develop a poor physical condition, particularly in the surface and subsurface layers. It is much easier to prevent a poor condition than it is to cure it.

A good rotation must be selected. A good rotation not only provides fresh organic matter and nitrogen but also makes it possible to maintain good physical condition in the deeper portions of the soil as well as in the surface 6 inches. There is a tendency for most soils to develop a "plow-sole," or compacted layer, just beneath the surface layer. Often such a compacted layer is

[1] All Illinois publications listed in this report are available at the date of the issuance of this report. When they go out of print, they are likely to be replaced by others of a similar nature. The newer publications will then be sent.

Table 2. — COMPOSITION OF SEVEN FARM CROPS

As Grown for the Most Part on Soil Experiment Fields Located on Dark Soils in Central and Northern Illinois

Crop		Nitrogen	Phosphorus	Potassium	Calcium	Magnesium
		lb.	*lb.*	*lb.*	*lb.*	*lb.*
Corn	Grain, 100 bushels	97	13	25	5	9
	Stalks, 4,480 pounds	38	4	67	24	18
	Cobs, 1,120 pounds	5	Trace	9	1	1
	Total	140	17	101	30	28
Oats	Grain, 50 bushels	31	4	13	2	3
	Straw, 1,700 pounds	7	1	47	6	3
	Total	38	5	60	8	6
Wheat	Grain, 25 bushels	22	4	9	1	3
	Straw, 2,000 pounds	10	1	16	4	2
	Total	32	5	25	5	5
Soybeans	Grain, 25 bushels	95	5	28	4	4
	Straw, 2,840 pounds	31	1	15	46	26
	Total	126	6	43	50	30
Alfalfa	2,000 pounds	58	4	39	36	9
Red clover	2,000 pounds	55	3	40	38	9
Soybeans	2,000 pounds	52	3	18	28	18

Analyses by H. J. Snider.

present without being suspected until it becomes so bad that it seriously interferes with underdrainage. A plow-sole limits root penetration as well as underdrainage and lowers crop yields. Growing deep-rooting legumes, such as sweet clover and alfalfa, is the best remedy now known for lessening or preventing the development of this unfavorable condition. Legume-grass mixtures are better than pure legume stands because the dense fibrous root systems of the grasses help to bind the soil particles together in granules, thus increasing the power of the soil to absorb water and providing better protection against erosion.

Not only is it important to adopt a good rotation — it is just as important to manage the rotation properly. Crop residues, as well as part of the top growth of the legumes, should be returned to the soil.

The following four-field cropping system shows a type of rotation that provides for deep-rooting legumes and has other advantages for corn-belt farms.

	Field 1	Field 2	Field 3	Field 4
1950	Corn	Soybeans	Wheat (sweet clover)	Alfalfa-brome
1951	Soybeans	Wheat	Corn	Alfalfa-brome
1952	Wheat (sweet clover)	Alfalfa-brome	Soybeans	Corn
1953	Corn	Alfalfa-brome	Wheat	Soybeans
1954	Soybeans	Corn	Alfalfa-brome	Wheat (sweet clover)
1955	Wheat	Soybeans	Alfalfa-brome	Corn
1956	Alfalfa-brome	Wheat (sweet clover)	Corn	Soybeans
1957	Alfalfa-brome	Corn	Soybeans	Wheat

The above system is essentially a four-year rotation — three years are devoted to cash and feed grains and one year to a deep-rooting perennial legume. A special advantage in this system is

that alfalfa stays down two years; thus a farmer gets crops two years with one seeding. This system also provides a green-manure catch crop, sweet clover, to be plowed down for corn. It often is advantageous to fall-plow Types 43, 46, 48, 50, 65, 102, 107, 112, 116, 136, 138, 170, 177, 195, 245, 249, 251, 252, 254, 257, and 260. When fall plowing is practiced, the use of sweet clover may not be advisable because this crop is hard to kill with fall plowing.

In this system soil-improving-and-conserving legumes are on one-fourth of the land one year and half the land the next year, or on an average of more than one-third (37½ percent) of the land yearly. The legumes come at times in the rotation when the nitrogen supply in the soil is lowest. The corn crops follow deep-rooting legumes and thus benefit from the nitrogen they supply.

A four-field cropping system of this kind can be fitted into various situations without sacrificing its main features. It can be adjusted to differences in soil productivity or the tendency of a soil to erode, to different types of farming, to the production of new crops, to changing crop prices, or to hazards of weather, insects, diseases, and weeds. Crop choices and split cropping on one or more fields give the flexibility that is needed for meeting these problems.[1]

Following are seven other four-field rotations that can be used instead of the rotation of corn, soybeans, wheat, and alfalfa-brome chosen for illustration. They show further how flexible a four-field rotation is.

In Rotations 4 to 7 the fields have been split some years to permit two different crops to be grown.

[1] The subject of crop rotations is discussed in more detail in the U. S. Department of Agriculture Yearbook for 1938, pages 406-430, the Yearbook for 1943-1947, pages 527-536, and in the Yearbook for 1948, pages 191-202.

Other Four-Field Rotations

1.........	Corn	Corn	Oats	Sod
2.........	Corn	Soybeans	Oats	Sod
3.........	Corn	Soybeans	Wheat	Sod
4.........	Corn	Corn-soybeans	Oats	Sod
5.........	Corn	Oats-soybeans	Wheat	Sod
6.........	Corn	Soybeans	Oats-wheat	Sod
7.........	Corn	Corn-soybeans	Oats-wheat	Sod

(Sod here = mixed legumes and grasses.)

Other rotations than the four-field cropping system can be used. A three-year rotation of corn, soybeans, wheat (or oats), with a catch crop of sweet clover seeded in the small grain, is one possibility. There is some doubt, however, whether the sweet-clover catch crop will maintain the supply of organic matter and nitrogen in the soil. For rolling land it is better to plan longer rotations and put more of the land in sod crops. A rotation such as corn, oats, sod, sod, sod has merit as an erosion-control cropping system.

Protect soil against erosion. In Christian county as a whole, erosion control is not a major problem. There are, however, about 35,000 acres of tillable land, or about 8 percent of the area of the county, where special water-control practices must be used to prevent destructive erosion. In addition, about 27,000 acres, or 6 percent of the area of the county, is so steep that permanent pasture or timber is the only solution to the erosion problem.

Even gentle slopes of only 1½ to 2 percent are subject to harmful erosion, but good farming methods will give satisfactory control on such slopes. Any or all of the following practices may be needed: (1) treating the soil in such a way as to encourage vigorous plant growth, (2) protecting the soil with a vegetative covering as much of the time

as practicable, (3) plowing down all crop residues, (4) plowing in the spring rather than in the fall, (5) cultivating on the contour, and (6) building grass waterways.

Detailed directions for controlling erosion will be found in Farmers' Bulletin 1795, "Conserving Corn Belt Soils," published by the U. S. Department of Agriculture, Washington, D. C., and in Illinois Circular 513, "Save the Soil with Contour Farming and Terracing."

Use good tillage practices. Soils that are to produce maximum crop yields must be kept in good physical condition. There is abundant evidence that the once good physical condition of many of our soils has deteriorated to the danger point. This is true of our lighter silt loams as well as of the heavier silty clay loams and the clay loams. Deterioration of this kind is gradual and not easily noticed. Many farmers do not become aware of what is happening to the physical properties of their soils until their soils have become very poor and difficult to work.

The rate of physical deterioration has been unusually rapid during recent years because of the urge to put a larger acreage than normal into corn and soybeans. Many farmers are complaining about slower underdrainage and the development of "wet spots." This is the direct result of poor cropping practices which permit the development of poor structure in the surface soil and a compacted layer beneath the surface soil. While deep tillage helps to break up such a compact, slowly permeable layer, it is expensive and no one knows how long the good results will last on various kinds of soils. The best and probably the only way to maintain good physical condition in the surface soil and in the deeper layers is to use a good rotation that includes deep-rooting legumes and fibrous-rooted grasses, to turn down all crop residues, and to till the soil only when the amount of moisture in the surface and the subsurface is right for good tillage.

For further information on the importance of good tillage practices, see Illinois Circular 655, "Tilth of Corn-Belt Soils."

Work Out a Detailed Program

After having identified the soil types that occur on your farm, studied the recommendations for the use and management of your soils, and noted the general recommendations for good soil management, you will be able to organize your land-use and soil-management practices into an efficient program if you have not already done so. In order to study field arrangement, cropping systems, and soil treatment programs, it is often helpful to have the soil map on a large scale. A larger map for any particular farm can be easily made by following the directions given below.

First find on the colored map the section or sections in which your farm lies. Mark off this area with lines ¼ inch apart. Draw lines both across the area and up and down, beginning at the section lines. Since the scale of the colored map is *1 inch to the mile,* the lines ¼ inch apart will represent quarter-mile lines and each quarter-inch square a 40-acre tract.

Now, on a separate sheet of paper, draw lines that are 2 inches apart, making 2-inch squares. With the quarter-mile lines on the colored map as guides and with the outline of the farm in mind, the soil areas on the map that pertain to your farm can be drawn in the

2-inch squares. Then you will have an enlarged map of your farm, with a 2-inch square for a 40-acre tract, or a scale of *8 inches to the mile.*

The soil map can be enlarged to any other scale by following these steps and enlarging the squares proportionately.

After the soil map has been enlarged, fence lines and field boundaries can be drawn in. On most farms in Christian county it will be found that fence lines and field boundaries are straight lines that usually have no relation to soil types or slopes. On nearly level areas in which the various soil types have similar use-and-management requirements, straight field boundaries are an advantage, but in the more rolling parts of the county straight lines must be changed and be made to conform to soil types and slopes if the land is to remain permanently productive. Many fields, especially in the rolling areas, contain two or more soils that call for widely different management and different kinds of crops. When the area of any type is very small it often is necessary to farm this small area in the same way as the adjacent area. Often, however, the areas of the different types are large enough so that rotations can be split or boundaries of fields rearranged to allow each type to be devoted to its own best permanent use.

Usually several good field arrangements and cropping systems can be worked out for any given farm. Some farms may require two or more different cropping systems. For example, a farm that includes bottomland, rolling upland, and level upland may require three different crop rotations if these three kinds of land are to be used to best advantage. The three crop rotations must be coordinated, of course, to make an efficient cropping system for the farm as a whole.

The various points of good soil management — adequate drainage; testing for acidity, phosphate, and potash; application of limestone and fertilizers; selection of a good crop rotation to provide organic matter and nitrogen; protection against erosion; and good tillage practices — should be considered carefully in developing the plan. As soon as a definite, well-coordinated crop and soil-management plan has been completed, it should be put into operation. There is no regular order, however, in which changes should be made, since conditions vary considerably from farm to farm. If drainage is not adequate, this condition must first be corrected before the best returns can be obtained from a good crop rotation and soil treatment. Also, on acid soils it is necessary to apply limestone before a good rotation, including the proper kind and acreage of deep-rooting legumes, can be adopted. On acid soils, therefore, limestone should be applied early in the soil-improvement program.

It is important to keep in touch with the latest information on cropping practices and soil treatments. Your farm adviser will be glad to help you plan a good crop and soil-management program for your farm and keep it up to date.

Meanings of some technical terms. In discussing soils and giving accurate descriptions of different types, some terms have to be used that may be unfamiliar to many readers of this report. The terms most likely to need explanation are defined on pages 61 and 62. We suggest a study of this list and frequent reference to it.

Table 3. — CHRISTIAN COUNTY SOILS: Areas of the Different Types

Type No.	Type name	Area in square miles	Area in acres	Percent of total area
8	Hickory gravelly loam	25.47	16 302	3.60
13	Bluford silt loam	1.46	932	.21
14	Ava silt loam	.14	89	.02
43	Ipava silt loam	34.01	21 769	4.80
46	Herrick silt loam	106.10	67 906	14.99
48	Ebbert silt loam	4.55	2 914	.64
50	Virden silty clay loam	104.81	67 082	14.80
65	Illiopolis silty clay loam	75.98	48 624	10.73
72	Sharon loam, bottom	.99	635	.14
74	Radford silt loam, bottom	25.89	16 568	3.66
80	Alexis silt loam, terrace	.57	363	.08
81	Littleton silt loam, terrace	1.58	1 014	.22
87	Sumner sandy loam, terrace	.21	134	.03
99	Vance silt loam, rolling phase	.94	600	.13
102	LaHogue loam	.04	23	.01
107	Sawmill clay loam, bottom	17.10	10 943	2.42
112	Cowden silt loam	14.53	9 299	2.05
113	Oconee silt loam	12.89	8 252	1.82
116	Whitson silt loam	1.17	748	.17
117	Bogota silt loam	16.75	10 721	2.37
118	Alma silt loam	21.15	13 534	2.99
119	Elco silt loam	1.75	1 122	.25
120	Slick spot	2.96	1 896	.42
127	Harrison silt loam	38.43	24 593	5.43
128	Douglas silt loam	3.80	2 434	.54
134	Camden silt loam, terrace	3.84	2 455	.54
135	Potomac sandy loam, terrace	.39	250	.06
136	Brooklyn silt loam, terrace	.17	109	.02
138	Shiloh clay loam	.88	561	.12
170	Breese silt loam	1.85	1 187	.26
177	Orio silt loam, terrace	1.48	949	.21
184	Roby fine sandy loam	1.38	880	.19
186	Kincaid fine sandy loam	1.11	711	.16
190-98	Onarga fine sandy loam—Hagener loamy fine sand, undifferentiated	.73	468	.10
195	Hersman clay loam, terrace	.18	116	.03
245	Denny silt loam (45)	5.31	3 397	.75
246	Bolivia silt loam	76.82	49 164	10.85
247	Tovey silt loam	22.93	14 678	3.24
249	Edinburg silty clay loam	2.90	1 854	.41
250	Velma loam	10.01	6 404	1.41
251-252	Owaneco silt loam—Harvel silty clay loam, undifferentiated	1.48	949	.21
253	Stonington loam, terrace	.52	335	.07
254	Hartsburg silty clay loam (244)	34.86	22 311	4.92
255	Vanderville silt loam	3.46	2 214	.49
256	Pana silt loam	.71	456	.10
257	Clarksdale silt loam	1.84	1 180	.26
258	Sicily silt loam	5.36	3 431	.76
259	Assumption silt loam	5.57	3 564	.79
260	Dunkel silt loam	8.65	5 536	1.22
264	Hickory sandy loam	1.77	1 130	.25
Pond		.17	106	.02
G.P.	Gravel pit	.05	32	.00
L.Q.	Lime quarry	.00	3	.00
M.D.	Mine dump	.23	146	.03
	Pana reservoir	.10	62	.01
	Total	708.02	453 135	100.0

SOIL TYPES OF CHRISTIAN COUNTY, THEIR USE AND MANAGEMENT

A list of the soil types in Christian county and the area each occupies is given in Table 3, page 15. The various types are discussed here in the same order as in the table. For an alphabetical list of soil types, with an index to page numbers, see page 63; for a numerical index see Table 8, pages 50-51.

Hickory gravelly loam (8)

Hickory gravelly loam is an upland soil developed under forest vegetation. It usually is found on the steeper slopes between upland and bottomland or along deep gullies leading away from the bottomland. These slopes ordinarily exceed 15 percent, but in some areas in Christian county this type occurs on slopes as low as 7 percent. Hickory gravelly loam occupies over 16,000 acres in Christian county, or about 3½ percent of the area of the county.

Soil profile. In most areas where this type is found the removal of soil material by erosion has been so rapid that little or no profile development has taken place. As a result, a leached, pebbly till is frequently exposed. In a few places, however, as much as 20 inches of silty material covers the till. Under this condition the surface soil usually consists of 2 to 4 inches of brownish-yellow silt loam. Below this there may be 2 to 3 inches of yellowish silt loam subsurface. The subsoil, which begins at depths of 4 to 10 inches, is a brownish-yellow silty clay loam 5 to 10 inches thick. The underlying glacial till is variable as to texture — in some places it is friable and contains many pebbles, but in most areas it is compact and plastic "gumbotil."

Use and management. Hickory gravelly loam is not suitable for cultivation. Those areas occurring on the more gentle slopes, however, may be used for permanent pasture provided care is taken to prevent overgrazing. Usually some limestone and phosphate must be applied before satisfactory growth of pasture plants, particularly legumes, can be expected.

Timber should be grown where erosion has been severe or where the slopes are very steep. Various species of pine, including red, jack, Virginia, and shortleaf, as well as white, which is shown on sandy soil in Fig. 4, are also adapted to Hickory and will grow well on these steep slopes.

For information on gully control and on the planting of trees write for Circulars 593, "Grass or Gullies," and 567, "Forest Planting on Illinois Farms."

Bluford silt loam (13)

Bluford silt loam is a light-colored upland soil developed under forest vegetation. It is found in the southeastern part of Christian county, usually on areas with a slope of 1½ to 3½ percent. A few areas sloping less than 1½ percent are included with this type, which occupies 932 acres in Christian county.

Soil profile. The surface is a yellowish-gray silt loam 6 to 7 inches thick. The subsurface is a silt loam, yellowish gray in the upper part and pale yellowish gray in the lower part.

Forty-year-old, well managed white pine plantation located on sandy soil. Other species of pine also grow well on sand, including red, jack, Virginia, and shortleaf. Fig. 4

The subsoil, which begins at 16 to 18 inches, is mixed gray and pale yellow. It is a plastic medium-compact silty clay. The structure particles are heavily coated with gray silty material.

Use and management. Bluford silt loam is acid and low in organic matter and nitrogen and in phosphate and potash. The more level areas of this soil type need drainage, which has to be provided by ditches and furrows.

Series 100 on the Enfield soil experiment field in White county is located on Bluford silt loam, and the results from this series indicate what may be expected from Bluford in Christian county if it is treated in the same way as the Enfield field. Four and two-thirds tons of rock phosphate an acre, costing $43.80, not including cost of application, was applied to the phosphate plots between 1912 and 1933. Forty-two hundred pounds of kainit an acre was applied to the potash plots from 1912 to 1931, and 1,000 pounds of muriate of potash from 1932 to 1945, at a total cost of $63.75 for potash. Table 4 gives the results secured under these treatments.

Even though the cost of the phosphate and potash treatments was high, rock phosphate gave a net return in the residues, or grain, system of $1.24 an acre a year for the 34-year period ending in 1946. In the manure, or livestock, system the net return was just twice as much, or $2.48 an acre a year. Potash gave large increases for all crops, with an average annual net return of $5.20 an acre.

The data do not show whether smaller applications of rock phosphate and potash would give similar average yields,

Table 4. — Rock Phosphate and Potash Experiments on the Enfield Experiment Field in White County, 1913-1946

Series	Average annual yields per acre								Value of increases[a]	
	CORN		OATS		HAY		WHEAT		Net annual acre returns without interest[b]	Net annual acre returns with interest[c]
	ROCK PHOSPHATE — Residues system									
	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100.............	25.2	2.1*	36.0	5.0**	1.44	.17	21.7	3.1**	$1.02	$1.24
	ROCK PHOSPHATE — Manure system									
	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100.............	35.9	2.6	39.8	0	1.93	.63*	22.4	4.6**	2.13	2.48
	POTASH — Residues system									
	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100.............	40.6	15.4**	43.7	7.7**	1.95	.51*	25.9	4.2**	3.46	5.20

KEY TO SOIL TREATMENT SYMBOLS: R=residues, M=manure, L=limestone, rP=rock phosphate, K=potash.
[a] Crop prices are from Illinois Cooperative Crop Reporting Service; rock phosphate and potash are included at cost.
[b] Returns from yield increases minus cost of rock phosphate or potash.
[c] Returns from yield increases minus cost of rock phosphate or potash plus or minus interest at 4 percent earned or paid out on capital invested in rock phosphate or in potash.
* Odds are more than 19 to 1 that the yield increase is not due to chance.
** Odds are more than 99 to 1 that the yield increase is not due to chance.

nor whether superphosphate would be more effective or less effective than rock phosphate. They do indicate that this soil is responsive to limestone, rock phosphate, and potash. The lesson for those who farm Bluford silt loam in Christian county is that soil tests should be made and these materials applied in amounts indicated by the tests as needed. A good rotation, including deep-rooting legumes and fibrous-rooted grasses, is also necessary in order to supply nitrogen and organic matter and to improve the physical condition of this soil.

On the more-sloping areas of Bluford some attention should be given to erosion control. On slopes greater than 2 percent, good crop and soil management should be supplemented with contour tillage and grass waterways for the effective control of erosion.

Ava silt loam (14)

Ava silt loam is a light-colored upland soil developed on slopes of 3½ to 7 percent under forest vegetation. It is found in the southeastern part of Christian county in association with Bluford silt loam. It occupies a total area of only 89 acres in Christian county.

Soil profile. The surface is a grayish-yellow friable silt loam about 5 inches thick. The subsurface is a yellowish silt loam, and the subsoil, beginning at 10 to 14 inches, is a brownish-yellow silty clay loam.

Use and management. The appearance of Ava silt loam is similar to that of Alma silt loam, page 31. Ava, however, is more highly weathered and somewhat less productive than Alma. The sug-

gestions made for the use and management of Alma silt loam, pages 31 and 32, apply equally well to Ava silt loam.

Erosion is active and destructive on Ava silt loam, which is low in organic matter, nitrogen, phosphorus, and potash. When limed and fertilized as indicated by the soil tests, it is a good alfalfa soil and should be kept in pasture or meadow much of the time. It should respond to fertilization as well as, or better than, Bluford silt loam, but there are no experimental data for Ava to confirm this judgment.

Ipava silt loam (43)

Ipava silt loam is a dark upland soil that has developed under grass on slopes of ½ to 1½ percent. It is found in association with Illiopolis silty clay loam, Bolivia silt loam, and Tovey silt loam. It occupies about 22,000 acres, or nearly 5 percent of the area of Christian county.

Soil profile. The surface soil is a brown to dark-brown silt loam 12 to 14 inches thick. The subsurface is a brown light-silty clay loam. When dry it has a faint grayish cast. The subsoil, which begins at 18 to 20 inches, is a somewhat compact and plastic yellowish-gray silty clay loam mottled with pale yellow and dark brown. It is calcareous at depths of 45 to 70 inches.

Use and management. Tile draw well in Ipava silt loam and are generally needed to obtain satisfactory drainage. In the northern and northeastern parts of the county where Ipava is underlain by sand at a depth of 4 to 5 feet (areas indicated by diagonal blue hatching on the colored map), difficulties may arise in connection with the tiling system. The sand may fill the tile or the tile may wash out of line if they must be laid so deep, in crossing a ridge, that they lie in the sand. Erosion is a minor problem on this soil because the slopes are gentle and the soil absorbs water very well. In a few areas, however, where water from higher land runs across Ipava, there may be some danger of erosion.

If Ipava silt loam is well farmed and kept in good physical condition, it is a productive soil and is easy to work. It should be tested for acidity, phosphate, and potash, and limed and fertilized as indicated by the tests. This soil is likely to respond to rock phosphate and potash as well as, and perhaps better than, the Carthage experiment field in Hancock county (Table 5).

Note that on the Carthage field the yield increases due to the use of rock phosphate are small. During recent years, however, there has been an upward trend in the increases shown for wheat and hay on the phosphate plots in the residues system. In the manure system no significant trend is indicated by the increases in any of the crops on the phosphate plots. A total of 8,000 pounds of rock phosphate an acre applied on the phosphate plots from 1911 through 1924 has given a net return of $1.24 an acre a year in the residues system and 20 cents an acre a year in the manure system for the 36 years 1911 to 1946. In determining net returns, the original cost of the rock phosphate plus 4 percent interest on the investment were taken into account, but no charge was made for applying the phosphate.

Before 1932 potash was applied to the potash plots in the form of kainit, and since 1932, in the form muriate of potash or its equivalent. The rate at which the kainit was applied varied from 4,000 to 4,600 pounds an acre; the rate for muriate of potash varied from 1,000 to 1,300 pounds an acre.

Table 5. — Rock Phosphate and Potash Experiments on the Carthage Experiment Field in Hancock County, 1912-1946

Series	Average annual yields per acre								Value of increases[a]	
	CORN		OATS		HAY		WHEAT		Net annual acre returns without interest[b]	Net annual acre returns with interest[c]
	ROCK PHOSPHATE — Residues system									
	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	75.5	3.0	54.6	1.2	1.78	.26	28.3	2.1	$ .63	$1.01
200	61.6	1.8	59.4	−.2	2.07	.34	28.5	2.0	.85	1.20
300	75.2	.4	43.8	2.4	1.79	.20	28.2	1.2	.09	−.31
400	62.2	4.0	47.0	1.7	1.91	.48	26.1	1.5	2.33	3.07
Average[d]	68.6	2.3*	51.2	1.3	1.89	.32**	27.8	1.7**	.98	1.24
	ROCK PHOSPHATE — Manure system									
	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	77.6	6.9	58.6	2.9	2.87	.10	29.2	1.6	$2.04	$3.17
200	59.0	.8	62.1	3.8	2.75	.05	27.6	1.5	−.20	−1.82
300	72.8	5.7	37.8	.5	2.65	−.12	30.0	1.8	.71	1.36
400	62.5	.2	52.8	3.1	2.71	.03	28.4	−.8	−.61	−1.93
Average[d]	68.0	3.4**	52.8	2.6**	2.75	.02	28.8	1.0*	.48	.20
	POTASH — Residues system									
	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	79.7	4.2	55.3	.7	1.88	.18	31.9	3.6	$ .84	$ .82
200	63.5	1.7	58.9	−.5	1.67	−.09	29.9	1.2	−.64	−2.48
300	78.8	3.6	42.0	−1.7	1.91	.19	30.4	2.3	−.15	−.81
400	65.3	3.0	50.0	3.0	2.19	.28	29.4	3.4	.44	.76
Average[d]	71.8	3.1**	51.6	.4	1.91	.14*	30.4	2.6**	.12	−.43

KEY TO SOIL TREATMENT SYMBOLS: R=residues, M=manure, L=limestone, rP=rock phosphate, K=potash.
[a] Crop prices are from Illinois Cooperative Crop Reporting Service; rock phosphate and potash are included at cost.
[b] Returns from yield increases minus cost of rock phosphate or potash.
[c] Returns from yield increases minus cost of rock phosphate or potash plus or minus interest at 4 percent earned or paid out on capital invested in rock phosphate or in potash.
[d] Tests of significance were applied only to the *average* crop yield increases.
* Odds are more than 19 to 1 that the yield increase is not due to chance.
** Odds are more than 99 to 1 that the yield increase is not due to chance.

Potash on the Carthage field gave significant increases in corn, wheat, and clover, but the increases were not large enough to produce a net profit after subtracting the cost of the large amounts of potash applied and interest charges. Smaller applications of potash might give profitable returns.

Beginning in 1929 small amounts of rock phosphate, superphosphate, and mixed fertilizer were applied as supplementary treatments on a part of each of the standard-treatment and check plots on the Carthage field. Rock phosphate and superphosphate were applied during the period 1929-1940 (rock phosphate at an average yearly rate of 161 pounds an acre and superphosphate at the rate of 89 pounds an acre). Mixed fertilizer was applied throughout the twenty years 1929-1948 at an annual acre-rate of 82 pounds of 2-12-6 fertilizer or equivalent amounts of some other fertilizer mixtures. The average wheat yields on the check plots in the residues system during these twenty years were increased 4.9, 6.2, and 9.4 bushels an acre a year by the supplementary treatments of rock phosphate, superphosphate, and mixed fertilizer respectively. On the standard RL plots the corresponding increases were 3.2, 4.4, and 6.0 bushels, and on the standard RLrP plots they were 1.5, 2.8, and 5.2 bushels. In-

creases in the yield of wheat in the manure system that were due to the supplementary treatments were a little more than half as much as in the residues system. The other crops in the rotation showed little response to the supplementary treatments.

A good crop rotation, including deep-rooting legumes and fibrous-rooted grasses, is an essential part of a sound soil-management system for Ipava silt loam. The legumes help to prevent nitrogen deficiency and also are effective in keeping the deeper parts of the soil in good physical condition. The fibrous roots of the grasses help to maintain good physical condition in the upper few inches of the soil.

Herrick silt loam (46)

Herrick silt loam is a dark upland soil developed under grass vegetation on nearly level areas and on gentle slopes. Slopes very seldom exceed 1.5 percent. This type occurs in association with Virden silty clay loam, Harrison silt loam, and Douglas silt loam. It is the most extensive type in Christian county, covering nearly 68,000 acres, or about 15 percent of the total area of the county.

Soil profile. The surface soil is a silt loam 10 to 12 inches thick. When moist it is brown, but when dry it has a distinctly grayish cast. The subsurface is a grayish-brown silt loam. At the base of this horizon there is a thin brownish-gray silty layer. The subsoil, which begins at about 16 to 18 inches, is a yellowish-gray silty clay splotched with rusty brown. It is moderately compact and plastic.

Use and management. Herrick silt loam is a moderately productive soil when well farmed. It underdrains moderately slowly, making it necessary to place the strings of tile closer together than in a more open soil. On this soil type erosion is only a minor problem and can be controlled by a good cropping system with contour tillage on the longer slopes.

The soil tests should be made as a guide to liming and fertilizing; and a good rotation, including deep-rooting legumes and fibrous-rooted grasses, should be adopted. The results from applying rock phosphate and potash to this soil on Series 200, 300, and 400 of the Carlinville experiment field in Macoupin county (see Table 6) indicate what may be expected from similar treatment of this soil in Christian county.

A total of 8,900 pounds of rock phosphate was applied to the phosphate plots on this field before 1933. None has been applied since that time. The yield increases obtained by the use of rock phosphate, although small, were large enough to give a net return of 86 cents an acre a year in the grain system of farming. In the manure or livestock system of farming the increases in yield for rock phosphate were so small that there was a net loss of 65 cents an acre a year after subtracting the initial cost and interest charges for the large amount of rock phosphate applied. Increases in wheat yields attributable to rock phosphate have been 50 percent larger in both systems of farming since 1930 than for the years 1910 to 1946.

From 4,600 to 5,000 pounds of kainit an acre were applied to the potash plots from 1910 to 1931 and from 1,100 to 1,200 pounds of muriate of potash an acre were applied from 1932 to 1946. This large amount of potash has increased crop yields. These increases have been small except on corn, where they were moderately large, amounting to 7.7

Table 6. — Rock Phosphate and Potash Experiments on the Carlinville Experiment Field in Macoupin County, 1910-1946

Series	Average annual yields per acre								Value of increases[a]	
	CORN		OATS		HAY		WHEAT		Net annual acre returns without interest[b]	Net annual acre returns with interest[c]
	ROCK PHOSPHATE — Residues system									
	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
200	42 2	3.4	55.1	2.7	2.32	.46	31.4	5.1	$2.07	$1.76
300	49.3	1.0	43.8	.7	2.96	.57	27.6	4.1	1.49	1.17
400	53.9	1.7	46.1	2.6	2.85	.41	23.2	1.6	.61	−.36
Average[d]	48.5	2.0**	48.3	2.0	2.71	.48**	27.4	3.6**	1.39	.86
	ROCK PHOSPHATE — Manure system									
	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
200	56.8	.9	61.2	−.4	3.08	.27	32.1	1.8	$ .34	−$1.10
300	55.6	1.5	46.7	−.4	4.14	.61	28.2	4.2	2.03	1.53
400	63.1	−.9	47.9	−.2	3.14	.10	26.5	.9	−.60	−2.37
Average[d]	58.5	.5	51.9	−.3	3.45	.33*	28.9	2.3**	.59	−.65
	POTASH — Residues system									
	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
200	60.7	13.1	59.3	4.2	2.80	.47	32.6	1.2	$2.14	$1.58
300	53.0	3.7	44.8	−1.4	2.80	.26	30.3	2.8	−.40	−1.59
400	55.2	6.4	48.5	2.4	2.97	.26	24.4	1.2	.50	−.95
Average[d]	56.3	7.7**	50.9	1.7	2.86	.33**	29.1	1.7**	.75	−.32

KEY TO SOIL TREATMENT SYMBOLS: R = residues, M = manure, L = limestone, rP = rock phosphate, K = potash.

[a] Crop prices are from Illinois Cooperative Crop Reporting Service; rock phosphate and potash are included at cost.

[b] Returns from yield increases minus cost of rock phosphate or potash.

[c] Returns from yield increases minus cost of rock phosphate or potash plus or minus interest at 4 percent earned or paid out on capital invested in rock phosphate or in potash.

[d] Tests of significance were applied only to the *average* crop yield increases.

* Odds are more than 19 to 1 that the yield increase is not due to chance.

** Odds are more than 99 to 1 that the yield increase is not due to chance.

bushels an acre for the period 1910 through 1946. The response of corn to potash, as well as the response of the other crops except clover, has been greatest since about 1935 on the Carlinville field. The net loss for potash applied in large amounts on the Carlinville field was 32 cents an acre a year for the period 1910 to 1946.

If the soil tests show that available potassium is low, potash should be applied; if phosphorus is low, either rock phosphate or superphosphate should be applied in amounts to insure vigorous growth of legumes. It is good practice to supplement the above treatments with a mixed fertilizer high in phosphate, such as 0-20-10, for wheat, and one high in potash, such as 0-10-20, for corn. An essential part of this program is to follow a good rotation; otherwise nitrogen and organic matter will be deficient and the physical condition of the soil will deteriorate.

Ebbert silt loam (48)

Ebbert silt loam is a grayish upland soil. It developed under grass vegetation either on very flat areas or in shallow depressions. It generally occurs in association with Cowden silt loam and Herrick silt loam. Ebbert silt loam is a minor type in Christian county, occupying only about 3,000 acres.

Soil profile. The surface soil is a dark-gray to grayish-brown silt loam 10 to 12 inches thick. The subsurface is a dark-gray silt loam mottled with pale yellow. It is 10 to 14 inches thick. The subsoil, which begins at a depth of 18 to 24 inches, is a medium-compact and plastic silty clay loam. In color it is dark gray mottled with pale yellow.

Use and management. Ebbert silt loam is a moderately productive soil if well farmed. It underdrains slowly. Tile placed as shallow as possible and spaced not more than about 5 rods apart should provide satisfactory drainage during normal seasons. It is wise, however, to provide for periods of excessive rainfall by supplementing the tiling system with ditch and furrow drainage.

Soil tests should be made and the deficiencies shown by the tests should be corrected. There are no experiment-field or farm-yield data available to guide in fertilizing this soil. Observations made as the county was being mapped indicate that superphosphate gives good results when used on wheat and potash gives good results on corn. These observations suggest that Ebbert reacts towards fertilizers much as Herrick silt loam does (see page 21), although its level of productivity would likely be somewhat lower than that of Herrick.

Virden silty clay loam (50)

Virden silty clay loam is a dark soil found on nearly level or slightly depressional areas in the uplands of the central and southern parts of Christian county. It occupies about 67,000 acres and occurs in association with Herrick, Harrison, and Douglas silt loams.

Soil profile. The surface horizon is a dark-brown faintly granular silty clay loam that extends to a depth of 10 to 12 inches. When dry, the surface has a distinct grayish cast. The subsurface is a grayish-brown silty clay loam. The subsoil, which begins at a depth of 18 to 20 inches, is a brownish-gray silty clay loam with dark coatings, which are the result of organic matter moving into the subsoil. Below 30 inches the material becomes light gray mottled with yellow and is quite friable.

Use and management. The first requirement of Virden silty clay loam is adequate drainage, and this is sometimes difficult to provide as tile draw somewhat slowly and good outlets are not always available.

Virden silty clay loam is productive when well drained and in good physical condition. Unless well farmed under a system that includes frequent additions of organic matter and the growing of deep-rooting legumes and fibrous-rooted grasses, the physical condition of both the surface and subsurface layers slowly deteriorates. The surface soil develops a tendency to clod and the subsurface becomes compact and more slowly permeable to water. The increasingly slower underdrainage commonly complained of is apparently due in part to the gradual development of a compact layer beneath the surface, this development having been speeded up by too frequent crops of corn and soybeans. It is good practice to plow this soil late in the fall and thus not have to plow it in the spring when the subsurface is too wet.

Soil tests should be made and deficiencies shown by the tests corrected. The Carlinville experiment field in Macoupin county gives the best available information on the effect of fertilizers on Virden silty clay loam (see Table 6).

Illiopolis silty clay loam (65)

Illiopolis silty clay loam is a dark upland soil, occurring on nearly level and slightly depressional areas in the northern half of Christian county. It developed under grass vegetation where natural drainage was poor. Illiopolis is found in association with Hartsburg silty clay loam, Ipava silt loam, and Bolivia silt loam. Its total area in Christian county is about 48,600 acres.

Soil profile. The surface of this type is a black silty clay loam about 15 inches thick. The subsurface is a very dark grayish-brown silty clay loam. The subsoil, which begins at a depth of 18 to 20 inches, is a gray silty clay loam mottled with pale yellow.

Use and management. Illiopolis silty clay loam, if well drained, is a productive, durable soil. Tile draw well, but it is sometimes hard to provide a good outlet to a natural drainageway. Where Illiopolis is underlain by sand (areas indicated by diagonal blue hatching on the soil map) and the tile are laid deep enough to be in it, there is danger that the sand will fill the tile or the tile will wash out of line.

Illiopolis, being a rather heavy soil, is more difficult to work than a lighter soil and, unless it is well farmed and a good rotation is used, it gradually becomes more and more difficult to work and to underdrain. On this soil it is particularly important to maintain a good supply of fresh organic matter to help keep the surface horizon in good physical condition. It is equally important to include deep-rooting legumes in the rotation in order to help keep the subsurface and subsoil from becoming compact and less permeable to water.

Under continuous tillage, Illiopolis tends to become more difficult to underdrain. The too frequent growing of corn and soybeans causes poor physical condition in the surface soil and the gradual development of a compacted layer beneath the plow depth. This condition restricts the movement of moisture and the penetration of roots, and is difficult to cure. The danger of developing this condition by continually growing intertilled crops has been largely ignored by farmers. Deep tillage may bring some improvement, but the improvement is only temporary. Fortunately the poor condition can be prevented by growing deep-rooting legumes and using suitable tillage methods. It is also considered good practice to fall-plow this soil. If plowing is delayed until spring, when other work often crowds, there is temptation to do it when the subsurface is too wet.

Soil tests should be made and any deficiencies shown by them corrected, so that deep-rooting legumes can be grown. If the tests show that the soil is acid, the required amounts of limestone should be added. If phosphorus is deficient, rock phosphate or superphosphate should be added. The results from the Carthage experiment field in Hancock county, which is located on soil similar to Illiopolis silty clay loam, are summarized in Table 5 on page 20. For a discussion of the results from the standard treatments on this field and from light applications of rock phosphate, superphosphate, and mixed fertilizers, turn to pages 19 to 21. The management practices suggested there for Ipava silt loam will likely apply also to Illiopolis silty clay loam.

Sharon loam, bottom (72)

Sharon loam is found in the bottoms of small streams in the southeastern part of Christian county. It is a light-colored soil formed from sediments recently deposited. In many places where this soil type occurs in Christian county, a dark soil is found buried at 40 to 60 inches below the light-colored sediments. Sharon loam occupies a total area of about 635 acres in Christian county.

Soil profile. The surface soil is variable in texture. Usually it is silty, but in places it contains some sand and gravel. The color of the surface varies from a grayish yellow to a light brown. Because of its youthfulness, no distinct horizons have developed in this soil. The texture is usually silty throughout the entire profile and a yellowish cast persists, but the color becomes more gray with depth.

Use and management. Although Sharon loam is subject to frequent overflow, most of the floods come in early spring or late fall, giving enough time to mature a crop of corn or soybeans. Small-grain crops frequently are drowned out. Where improved drainage is needed on this soil type, open ditches or tile may be used.

On those areas of this soil type where flooding is not too severe, some soil treatment will improve yields. Sharon usually needs limestone and some phosphate and potash. Soil tests should be made before applying soil treatments, since the need for treatment may vary considerably. Plowing down a crop of clover every few years is essential in a good soil-improvement program for this soil. Alsike or sweet clover usually give best results.

On those areas where the bottoms are very narrow and difficult to cultivate, pasture is probably the best use.

Radford silt loam, bottom (74)

Radford silt loam is a dark-colored soil found mostly along the bottoms of the small streams. It has been formed from sediments recently deposited on dark bottomland soils. Radford is the most extensive bottomland type in Christian county, occupying about 16,500 acres.

Soil profile. The surface of this type varies from a yellowish-brown to a brown silt loam. The thickness of this dark surface layer varies from about 12 to 30 inches. The soil buried under the surface layer is a black silty clay loam. In a few small areas the dark silty surface layer is missing. In others, particularly along Sangamon river, some sand is mixed with the silty surface.

Use and management. Radford silt loam is subject to brief overflows. Many areas are narrow and irregular and better adapted to pasture than to cropping. Areas suitable for cropping are better adapted to summer than to winter crops because winter crops may be injured by flooding. Open ditches or tile may be used to improve drainage where needed on this soil type. Where levees protect the fields from overflow, soil tests should be made and such treatments applied as the tests indicate are needed.

Fertilizer treatment is probably not justified on areas subject to frequent overflow.

Alexis silt loam, terrace (80)

Alexis silt loam is a dark soil. It occurs on the more rolling portions of the terraces along Sangamon and South Fork Sangamon rivers, where the slopes range from about 3 to 8 percent. It is a minor type in Christian county, occupying only 363 acres. It occurs in association with Littleton silt loam and Hersman clay loam but differs from those types in having developed under conditions which provided more rapid drainage.

Soil profile. The surface is a light-brown to brown silt loam 6 to 10 inches thick. The subsurface is a brownish-yellow silt loam. The subsoil begins at a depth of 14 to 18 inches and is a light brownish-yellow silty clay loam.

Use and management. Alexis silt loam is similar to Tovey silt loam. The suggestions for using and managing Tovey (see page 42) apply equally well to Alexis.

Littleton silt loam, terrace (81)

Littleton silt loam is a dark soil occurring on the silty terraces along South Fork Sangamon and Sangamon rivers. The native vegetation was grass. The slope of the areas where this soil is found ranges from about ½ to 3 percent. The total area occupied by Littleton silt loam in Christian county is about 1,000 acres.

Littleton silt loam occurs in association with two other terrace soils, Alexis silt loam and Hersman clay loam. It differs from those types as the result of having developed under different drainage conditions. Littleton has more rapid natural drainage than Hersman but slower natural drainage than Alexis.

Soil profile. The surface is a brown to dark-brown silt loam 10 to 12 inches thick. The subsurface is a yellowish-brown silt loam. The subsoil begins at a depth of 15 to 18 inches and is a brownish-yellow silty clay loam faintly mottled with gray. Below 35 inches the material becomes friable.

Use and management. Littleton silt loam is somewhat similar to Ipava silt loam. Tile draw well in Littleton and can be used on the flatter areas of this soil type. The suggestions made for the use and management of Ipava (see page 19) apply equally well to Littleton except that erosion-control measures are required on some areas of Littleton because of steeper slopes. On the more sloping areas of Littleton good soil and crop management, supplemented by contour cultivation and grassed waterways, will usually control erosion.

Sumner sandy loam, terrace (87)

Sumner sandy loam is a minor type in Christian county, occupying a total area of only 134 acres. It is a medium-dark soil found on slopes of 1 to 3 percent on the sandy terraces along South Fork Sangamon and Sangamon rivers.

Soil profile. The surface of this type is a sandy loam 8 to 12 inches thick, varying in color from brown to light brown. The subsurface is a light-brown sandy loam. The subsoil, which begins at a depth of 18 to 20 inches, is a yellowish-brown sandy clay loam. Below 35 to 40 inches there is usually loose sand.

Use and management. Sumner sandy loam is moderately acid. It is rather low in organic matter and in some areas is slightly drouthy. Erosion is not a serious

problem, although the surface is subject to some drifting by the wind.

The prime needs of this soil are limestone and organic matter. Lime should be applied in such amounts as soil tests indicate are needed. A rotation should be adopted that will make use of sweet clover as a green-manure crop. Drouth-resistant crops such as alfalfa, and small grains which mature ahead of hot dry weather, should make up the major part of the rotation. Corn, soybeans, rye, clover, wheat, and three years of alfalfa is such a rotation.

No definite statement can be made for fertilizing this soil. It seems likely that a mixed fertilizer such as 0-20-10 will give better results than rock phosphate and potash, although, at the present time, there are no experimental data that are definitely known to apply to this type.

Vance silt loam, rolling phase (99)

Vance silt loam, rolling phase, is a light-colored soil found on strongly sloping to steep areas along Flat Branch in the northeast-central part of Christian county. In this area most of the soils are derived from 45 to 60 inches of loess underlain by outwash sand. This type developed under forest vegetation on slopes of more than 7 percent. It occupies only 600 acres in Christian county.

Soil profile. The surface soil is a yellowish-gray silt loam 4 to 6 inches thick. The subsurface is a pale-yellow silt loam. The subsoil, which begins at a depth of 10 to 14 inches, is a brownish-yellow silty clay loam. Sand is usually found within 40 inches of the surface.

In some areas the surface and subsurface have been worn away by erosion. On the steeper slopes all of the silty loess covering, including the subsoil, often has been entirely removed and the underlying sand exposed, thus greatly reducing the value of this soil.

Use and management. Vance silt loam, rolling phase, is not adapted to cultivated crops. The more gentle slopes can be used for pasture and meadow. Areas to be used for these purposes should be tested for acidity, phosphorus, and potash and treated as the tests indicate. The steeper slopes and the areas where the outwash sands are exposed are better adapted to timber than anything else.

LaHogue loam (102)

LaHogue loam is a dark soil developed under grass vegetation on nearly level to very gently sloping areas. It is a very minor type in Christian county, occupying only 23 acres. It is found in a very narrow, discontinuous belt 2 to 3 miles long southeast of Stonington. A few very small areas of sandy loam are included with the type as mapped. The origin of the sandy parent material in this particular location is not known.

Soil profile. The surface soil is a brown to dark-brown loam 6 to 10 inches thick. The subsurface is similar to the surface in texture but more grayish brown in color. The subsoil, which begins at a depth of 17 to 20 inches, is a yellowish-gray sandy clay loam. Below the subsoil incoherent fine sand or a mixture of sand, silt, and clay is almost always found.

Use and management. The areas of this type in Christian county are so small and narrow that they must be farmed with surrounding soils. The requirements for treating and managing this soil are

somewhat similar to those for Ipava silt loam (see page 19), but yields are not so high as on Ipava. LaHogue loam can be tile-drained if necessary.

Sawmill clay loam, bottom (107)

Sawmill clay loam is a dark soil derived from heavy-textured sediments. It is found mainly in the wider bottomlands along Sangamon and South Fork Sangamon rivers and also along Flat Branch. It occupies a total area of about 11,000 acres in Christian county.

Soil profile. This type shows little profile development because it is formed from recent alluvial sediments. The surface is a dark grayish-brown to black clay loam to silty clay loam 10 to 15 inches thick. It is high in organic matter and nearly neutral in reaction to tests for acidity. Beneath the surface the material is a silty clay loam and is grayish black to dark gray in color.

Use and management. Sawmill clay loam is a productive soil if it is adequately drained. Drainage can ordinarily be best supplied by open ditches, although tile may be used satisfactorily in many places. Where not protected from overflow by levees, Sawmill clay loam should be used for summer crops. Very little, if any, soil treatment may be justified because overflows deposit sediment which in itself is frequently high in plant nutrients. Where the areas are protected by levees and adequate drainage has been provided, the use and management requirements for this soil are similar to those for Illiopolis silty clay loam given on page 24.

Some areas of this type in Christian county, particularly along Flat Branch, are naturally very poorly drained. The best use for areas that cannot be well drained is probably pasture or timber.

Cowden silt loam (112)

Cowden silt loam is a grayish upland soil developed under prairie vegetation on slopes of ½ to 1½ percent. Cowden is found in the southeastern part of Christian county, mainly in association with Oconee silt loam. It occupies about 9,000 acres, or 2 percent of the total area of the county.

"Slick spots," or "scalds," are numerous in this soil type. Most of such spots in Christian county have been indicated on the soil map but a few were too small to be shown.

Soil profile. The surface soil of Cowden is a brownish-gray silt loam 6 to 8 inches thick. The subsurface is a silt loam, gray in the upper part and light gray and ashy in the lower part. The subsoil, which begins at a depth of 16 to 21 inches, is a very compact and plastic silty clay. It is dark gray mottled with pale yellow. Hard, rounded, black pellets of iron and manganese are present throughout the soil profile.

Use and management. Without proper treatment Cowden silt loam does not give good yields. It can be made to produce much better, however, by improving drainage with furrows and open ditches, by adopting a good crop rotation, and by applying limestone, phosphate, and potash according to the needs indicated by soil tests.

Tile will not draw in this soil because the heavy, compact subsoil is very slowly permeable to water, making it necessary to depend on open ditches and furrows for drainage.

The surface soil is acid and low in organic matter. After lime has been added to correct the acid condition, a rotation that includes a high percentage of clovers should be used. The clovers, when plowed under, are a source of organic matter and nitrogen for the soil.

Practically all areas of this soil type that have been farmed for several years are low in available potassium and available phosphorus. The requirements for these elements can be taken care of by applying potash and either superphosphate or rock phosphate, and supplementing these elements with any manure that is available. There are no experimental data available to indicate what phosphate carrier will give the greater crop increases.

Usually erosion is not serious on Cowden silt loam. Some of the more sloping areas, however, may require attention if erosion is to be controlled. A good crop rotation and possibly cultivation across rather than up and down slopes are enough to control erosion on the steeper areas of this type.

After it has been treated and the other practices mentioned above have been adopted, this soil is suitable for all the grain crops common to the region, but corn usually does not do so well on it as do the small-grain crops.

Oconee silt loam (113)

Oconee silt loam is a grayish upland soil developed under prairie vegetation on slopes that range from 1½ to 3½ percent. It occurs in the southeastern part of Christian county in association with Cowden silt loam. It is also found in this section of the county at or near the base of some of the slopes of Harrison silt loam, Pana silt loam, and Douglas silt loam. This soil type has developed in these places because water, seeping down from the slopes, has intensified the soil-development processes, causing a more highly leached and weathered soil at the bottom of the slopes than on the slopes themselves, which receive only a normal supply of moisture. "Slick spots" occur in association with this soil. Unless these spots are very small, they are shown on the soil map. The total area of Oconee silt loam in Christian county is about 8,000 acres.

Soil profile. The surface soil is a brownish-gray friable silt loam 5 to 7 inches thick. The subsurface is yellowish gray, though the lower part is often ashy and splotched with orange or dull red. The subsoil is a compact, plastic grayish-yellow silty clay often splotched with dull red. Below 30 to 32 inches the material becomes more friable.

Use and management. On Oconee silt loam drainage should be provided by means of a system of surface ditching that will remove the excess surface water with as little erosion as possible. The furrows should be plowed across the slope in a way that will give enough fall to carry the water and at the same time cause as little washing as possible.

Contour farming and grass waterways, together with good soil treatment and good cropping practices, will take care of the erosion problem on most areas of this type. In some places the diversion-ditch type of terrace may be effective.

Oconee is usually acid and low in organic matter and nitrogen, phosphorus, and potassium. Soil tests should be made and soil treatments applied accordingly. The soil-treatment problems of Oconee silt loam are similar to those of Cowden silt loam, which have just been described (see opposite page).

Whitson silt loam (116)

Whitson silt loam is a light-colored upland soil developed under forest on nearly level to very gently sloping areas. This soil type occurs in association with Bogota silt loam, Alma silt loam, and Elco silt loam. It occupies a total area of 748 acres in Christian county.

Soil profile. The surface soil is a gray to dark-gray silt loam 6 to 7 inches thick. The subsurface is a silt loam, gray in the upper part and light gray and ashy in the lower part. The subsoil, which begins at a depth of 17 to 20 inches, is a compact, plastic silty clay. It is predominantly gray in color with some yellow mottling. Many small brown or black iron-manganese pellets occur on the surface and are also found throughout the soil profile.

Use and management. Whitson silt loam is acid and low in nitrogen, organic matter, phosphorus, and potash. There are no experiment-field data applying to this soil type.

Surface drainage has to be depended on to remove excess water because this soil will not tile. Soil tests should be made to determine to what extent phosphate and potash are deficient and the amount of limestone needed. After good drainage has been provided and acidity corrected, a good rotation should be adopted in order to provide the necessary nitrogen and organic matter. Rock phosphate may be used to supply phosphate to fields to be seeded to wheat or to oats and clover, or superphosphate may be drilled when the small grain is planted. If no legume has been plowed down on a field to go in corn, the soil will be deficient in nitrogen as well as in the other nutrients. Under these circumstances the use of a complete fertilizer containing nitrogen may be advisable. As soon as a legume has been grown, however, nitrogen may be omitted from the fertilizer but the other elements must still be supplied. Where legumes are to be seeded, rock phosphate should be applied; fields to go in corn should have a high potash fertilizer such as 0-10-20; and where wheat is to be seeded, a high phosphate fertilizer such as 0-20-10 should be used even though rock phosphate has already been applied.

Bogota silt loam (117)

Bogota silt loam is a light-colored upland soil developed under forest vegetation on slopes ranging from 1½ to 3½ percent. It is found in association with Whitson silt loam, Alma silt loam, and Elco silt loam. The total area of this soil type in Christian county is about 10,700 acres.

Soil profile. The surface soil is a yellowish-gray silt loam 6 to 8 inches thick. The subsurface is yellowish gray in the upper part and pale yellowish gray to gray in the lower part. The subsoil, beginning at 16 to 20 inches, is a yellowish-gray silty clay loam to silty clay, medium compact and medium plastic. The entire profile has a yellowish cast. Many small brown or black iron-manganese pellets occur on the surface and throughout the soil profile.

Use and management. If untreated and poorly managed, Bogota silt loam is a low-producing soil. However, it is a responsive soil and with proper treatment and good management it will produce moderate yields of corn and good yields of wheat.

The surface soil is friable but during rains it tends to pack and crust. It is acid and low in organic matter, nitrogen,

available phosphate, and available potash. Surface drainage can best be obtained by means of furrows and open ditches. Because the subsoil is so compact, it is very doubtful if tile will draw. Under general farm conditions this soil erodes only moderately. On many areas contour cultivation, with grass waterways or terracing, is advisable. These practices are, however, not effective without soil treatment and management that will make vigorous plant growth possible.

Soil tests should be made to determine the need for limestone, phosphate, and potash. As soon as the acidity has been corrected, a good rotation should be adopted that will take care of the nitrogen and organic-matter deficiencies and will improve the power of the soil to absorb and retain water. After proper treatment, Bogota is excellent for alfalfa, and this crop will do much to improve the physical condition of the soil as well as furnish nitrogen for the grain crops.

Only tentative suggestions can be made for fertilizing this soil. The rather indifferent response of deep-loess soils like Bogota to rock phosphate suggests that, particularly for wheat, a high phosphate fertilizer such as 0-20-10 be used, and that for corn a high potash fertilizer such as 0-10-20 be used. If alfalfa is to be seeded, rock phosphate is a good kind of phosphate to use.

Alma silt loam (118)

Alma silt loam is a light-colored upland soil developed under forest vegetation on slopes ranging from 3½ to 7 percent. It occurs in association with Whitson, Bogota, and Elco silt loams, and occupies a total of about 13,500 acres in Christian county.

Soil profile. The surface soil is a grayish-yellow silt loam 4 to 6 inches thick. The subsurface, a yellowish silt loam, is 6 to 10 inches thick. The subsoil, which begins at 12 to 16 inches, is a brownish-yellow to yellow silty clay loam that is slightly compact and slightly plastic. Usually some gray mottlings are present in the lower part of the subsoil. In some areas severe erosion has partially or wholly worn away the surface and even the subsurface.

Use and management. Alma silt loam, if used for cropping, must be protected against soil erosion. To be successful, an erosion-control program for this soil must include various devices and practices. The soil must be so treated that a vigorous vegetative growth will be secured, and the cropping system must be so planned as to provide some protective vegetation on the ground as much of the time as possible. Terraces and other mechanical structures should be used wherever needed. Fall-plowing should be avoided unless it is in preparation for a fall-seeded crop like wheat or grass, which will give some protection to the soil.

Unless a vigorous erosion-control program can be undertaken and carried through, Alma silt loam should not be used for cultivated crops. Under any system of management not more than one cultivated crop in four years should be grown, and all cultivation should be done on the contour.

The soil treatment needed for vigorous vegetative growth includes the application of limestone; the use of stable manure, green manure, and stand-over legumes to supply nitrogen; and the application of phosphate and potash as needed. The amounts of these materials to be applied should be determined by testing the soil for acidity and for avail-

able phosphate and potash. There are no experimental data to serve as a guide in selecting the best phosphate carrier to use. Indirect evidence indicates that on this soil grain crops will not give much response to rock phosphate. Alfalfa and clover respond satisfactorily, but if wheat is to follow them, superphosphate should also be applied. If corn is to be grown where the tests show that potash is deficient, a mixed fertilizer such as 0-10-20 should be used.

Elco silt loam (119)

Elco silt loam is a light-colored upland soil developed under forest vegetation on areas with slopes of 5 to 10 percent. It occurs in association with Whitson silt loam, Bogota silt loam, and Alma silt loam. Elco covers a total area of about 1,100 acres in Christian county.

Soil profile. The surface soil is a grayish-yellow silt loam 2 to 5 inches thick. The subsurface is brownish yellow to yellow. In cultivated areas the surface and subsurface may be eroded away. The subsoil, which begins at a depth of 10 to 14 inches, is a brownish-yellow silty clay loam. It often has a reddish-brown cast. It is not very compact or plastic. Elco silt loam in Christian county occurs on slopes where the depth of loess varies from 20 to about 40 inches. Beneath the loess, weathered Illinoian till is found. In most areas of Christian county the underlying till is a heavy plastic "gumbotil" that is very slowly permeable to water.

Use and management. Elco silt loam is not adapted to cultivation because it erodes severely when so used. Its best use is for hay and pasture. It produces good sod crops, including alfalfa, after it has been limed and fertilized, particularly when it has been treated with phosphate.

Slick spot (120)

"Slick spots," also known as "scalds" or "scald spots," are areas of a very light-gray soil. Such spots are scattered throughout the southern half of Christian county. They usually occur in shallow depressional pockets or on nearly level areas. In some places, however, they are found on gentle slopes. They are usually small — less than 1 acre — although there are a few rather large spots in Christian county. Where these spots are small it is necessary to farm them with the surrounding soils.

Most of these spots in Christian county have developed under grass vegetation, although they also develop under forest vegetation. On the map some of them have been included with adjacent soil types because they are too small to be shown on so small a scale. These spots occupy a total of almost 1,900 acres in Christian county.

Soil profile. The surface soil of slick spots is a light-gray silt loam about 4 to 6 inches thick. Sometimes there is no subsurface, but when there is one it is an ashy, almost white, silt loam. Small black or brown iron-manganese pellets are present throughout the soil profile, and limestone pellets commonly occur in the subsoil, which begins at a depth of 6 to 16 inches. A compact silty clay loam to clay, the subsoil is nearly impervious to water. It is very sticky and easily puddled when wet and very hard when dry. Its color may be greenish gray, pale yellowish gray, or sometimes a light

The lower right-hand corner of this picture shows a slick spot where the claypan subsoil is within 5 inches of the surface. This spot never produces any corn but, when the season is favorable, it does produce good wheat. Fig. 5

brown. The unfavorable physical nature of the subsoil is due largely to an accumulation of alkali salts, mainly sodium. During periods of drouth a white powdery coating of these alkali salts on the soil particles can often be seen, especially where the subsoil has been exposed by erosion.

Use and management. At present no practical way is known of changing the unfavorable character of the subsoil of slick spots or of getting rid of these spots. One of the causes of poor crops on these spots is a lack of moisture during midsummer. Corn suffers more from this lack than do small grains.

In treating slick spots drainage must be provided, usually by means of furrows and open ditches since tile will not draw. In some spots an open catch basin leading into tile can be used to remove excess surface water. Where drainage cannot be provided, no treatment of this soil is recommended. If the surface soil is acid, as it usually is, enough limestone should be applied to enable sweet clover to grow. The sweet clover may be allowed to reseed itself for several years and may then be plowed under. Additions of organic matter made in this way will add to the supply of available nitrogen in the soil and also lessen the tendency of the surface soil to pack after rains.

An application of animal manure, practical experience shows, will benefit these spots for only a year. The manure might better be used for other soils where it will give better returns.

No further treatment for slick spots can be suggested at this time. Crop yields on these spots vary from nothing in unfavorable years to a small yield in a season when the moisture is just right. Small grains almost always yield better than corn.

Harrison silt loam (127)

Harrison silt loam is a dark soil found on gentle slopes in the central and southern parts of Christian county, where it occupies a total area of about 24,500 acres. It has developed under a grass vegetation. It occurs in association with Virden silty clay loam, Herrick silt loam, and Douglas silt loam.

Soil profile. The surface is a brown friable silt loam 7 to 9 inches thick. When dry it has a grayish cast. The subsurface is grayish brown with a gray cast, especially in the lower 2 or 3 inches. The subsoil, which begins at a depth of about 18 inches, is a brownish-yellow moderately compact and slightly plastic silty clay loam. The lower subsoil, below 30 inches, becomes friable.

Use and management. Most of Harrison silt loam is subject to some sheet erosion, particularly on the areas where the slope approaches the upper limit for this soil type, 3½ percent. Erosion can, however, be reduced to a minimum with soil treatment that will make vigorous crop growth possible, a good cropping system and, on more sloping areas, contour cultivation, grass waterways, and occasionally terraces.

Soil tests should be made to determine the amount of limestone required for good legume growth and whether phosphate and potash fertilizers are needed. The Clayton experiment field in Adams county is considered fairly representative of this soil type. The results from this field offer a partial answer to the problem of phosphate and potash fertilization (see Table 7). Note that the responses of wheat, oats, and clover to rock phosphate were small but consistent enough to be significant. In the residues system increases were slightly higher than in the manure system. An average of all crops on all four series shows a net gain of 62 cents an acre a year for rock phosphate in the residues, or grain, system of farming and a net loss of $1.60 an acre for its use in the manure, or livestock, system. In these computations simple interest on the investment in rock phosphate at 4 percent, plus the original cost of the rock phosphate, is included, but no charge is made for applying it.

Heavy applications of rock phosphate were made from 1913 to 1933: 8,800 pounds on the phosphate plots of Series 100, 6,485 pounds on Series 200 and 300, and 8,400 pounds on Series 400. If lighter applications of rock phosphate would have given similar crop increases, the net returns in the residues system would have been still larger and the net loss in the manure system would have been reduced or changed to a net gain. The only conclusion that can be drawn at present from the experience with rock phosphate on the Clayton field is that its use on Harrison silt loam may be expected to produce small crop increases.

Potash on the Clayton field increased yields only slightly, except corn yields, which show an average yearly increase of 5.4 bushels over the entire period of thirty-five years. Potash fertilizer was used in large amounts, resulting in a loss of 4 cents an acre a year as an average of all crops when interest is charged at 4 percent on the investment in potash.

Study of the Clayton data leads to the suggestions that a good rotation be adopted and that a mixed fertilizer high in phosphate, such as 0-20-10, be applied for wheat and a fertilizer high in potash, such as 0-10-20, be applied for corn. In addition, the data indicate that rock phosphate should be applied for the first legume crop, and, in ten or twelve years, if soil tests show the need for additional phosphorus, more should be applied.

Table 7. — Rock Phosphate and Potash Experiments on the Clayton Experiment Field in Adams County, 1912-1946

Series	Average annual yields per acre								Value of increases[a]	
	CORN		OATS		HAY		WHEAT		Net annual acre returns without interest[b]	Net annual acre returns with interest[c]
	ROCK PHOSPHATE — Residues system									
	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP	RLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	63.4	1.4	59.8	1.7	1.87	.34	30.7	2.6	$ .12	−$ .70
200	56.9	1.9	63.8	3.1	1.90	.45	26.3	4.6	1.38	2.36
300	71.9	2.2	43.4	3.4	2.04	.23	27.3	1.8	.90	1.27
400	50.0	.7	52.4	2.9	1.97	.09	25.5	1.7	.31	− 46
Average[d]	60.6	1.6	54.9	2.8**	1.94	.28**	27.5	2.7**	.68	.62
	ROCK PHOSPHATE — Manure system									
	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP	MLrP	Increase for rP		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	60.6	−1.9	57.9	2.4	3.25	.13	28.3	2.3	−$1.06	−$2.19
200	65.3	3.5	66.5	2.3	2.26	.11	27.3	3.8	.17	−.23
300	77.2	.1	39.9	1.7	2.93	.14	31.8	1.8	−.09	−.91
400	62.2	−.1	57.7	2.7	2.75	.06	27.5	1.2	.58	−3.06
Average[d]	66.3	.4	55.5	2.3**	2.80	.11**	28.7	2.3**	−.10	−1.60
	POTASH — Residues system									
	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K	RLrPK	Increase for K		
	bu.	*bu.*	*bu.*	*bu.*	*tons*	*tons*	*bu.*	*bu.*		
100	67.7	4.3	59.9	.1	2.01	.15	31.0	.3	−$ .51	−$ .85
200	61.6	4.7	64.5	.7	2.01	.11	27.1	.8	−.67	−2.24
300	76.2	4.3	43.5	.1	2.24	.20	29.4	2.1	.07	−.04
400	58.0	8.2	54.3	1.9	2.32	.35	28.7	3.2	1.68	2.97
Average[d]	65.9	5.4**	55.6	.7	2.15	.20**	29.1	1.6**	.14	−.04

KEY TO SOIL TREATMENT SYMBOLS: R=residues, M=manure, L=limestone, rP=rock phosphate, K=potash.

[a] Crop prices are from Illinois Cooperative Crop Reporting Service; rock phosphate and potash are included at cost.

[b] Returns from yield increases minus cost of rock phosphate or potash.

[c] Returns from yield increases minus cost of rock phosphate or potash plus or minus interest at 4 percent earned or paid out on capital invested in rock phosphate or in potash.

[d] Tests of significance were applied only to the *average* crop yield increases.

** Odds are more than 99 to 1 that the yield increase is not due to chance.

Douglas silt loam (128)

Douglas silt loam is a medium-dark soil. It occurs on well-drained prairie knolls and ridges where the slope ranges from 3½ to 7 percent. It is found in the southern and southeastern parts of Christian county, where it is mainly associated with Harrison silt loam and Pana silt loam. Douglas covers a total area in Christian county of about 2,400 acres.

Soil profile. In uncultivated areas the surface soil is a light-brown silt loam 4 to 6 inches thick; on many areas that are cultivated it is very thin or entirely absent. The subsurface is friable and brownish yellow in color. The subsoil, which begins at a depth of 12 to 16 inches, is a brownish- or reddish-yellow slightly compacted silty clay loam. Below 21 to 24 inches the material becomes more friable and is yellow in color. On a few areas of this type the silty loess blanket is as thin as 20 inches, but generally it is 35 to 40 inches or more thick. Weathered Illinoian drift occurs beneath the loess. Thick gravel deposits sometimes underlie Douglas silt loam, but they are not close enough to the surface to make the soil drouthy.

Use and management. Douglas silt loam is a fairly productive soil when well farmed. It occurs on areas with slopes ranging from 3½ to 7 percent. This soil erodes seriously when cultivated unless erosion-control practices are used. Areas of Douglas that approach a 7-percent slope should usually be kept in pasture or meadow. Alfalfa does well on this soil. An alfalfa-grass mixture is suggested, however, since alfalfa alone is not a good erosion-control crop.

This soil was developed from loess, a good parent material, resting upon a very poor, strongly weathered glacial till. When all, or part, of the loess is removed, the agricultural value of the soil is reduced seriously and the reduction is permanent. Erosion losses can, however, be reduced materially by vigorous crop growth, together with contour tillage, grass waterways, and terraces. To secure vigorous crop growth, limestone and fertilizers are necessary. The soil should be tested, and should then be limed and fertilized as indicated by the tests. There is no experiment field located on this soil type to serve as a guide in its fertilization. It is believed, however, that the response to rock phosphate would be similar to or greater than that shown on the Clayton experiment field (see Table 7). On this soil there is, however, greater danger of losing the fertilizer by erosion than on a soil with more gentle slopes.

Camden silt loam, terrace (134)

Camden silt loam is a light-colored terrace soil found along the bottomland bordering the larger streams in Christian county. It has developed under forest vegetation on areas with slopes of 1½ to 3½ percent. A few small areas having slopes of less than 1½ percent were included with this type on the soil map. Camden occupies about 2,400 acres in Christian county.

Soil profile. The surface of this soil type is a yellowish-gray silt loam 6 to 8 inches thick. The subsurface is a grayish-yellow silt loam 6 to 10 inches thick. The subsoil, which begins at a depth of 17 to 20 inches, is a grayish-yellow to yellow medium-plastic silty clay loam. Below 30 to 40 inches there usually are layers of loose sand or gravel. These sand or gravel beds may extend 10 to 15 feet or more in depth. They are seldom near enough the surface to cause so much underdrainage as to produce a drouthy condition.

Use and management. Camden silt loam produces low yields, when untreated, but it responds well to good management. The surface soil is nearly always acid enough to need some limestone. The amount to apply should be determined by the soil tests. After liming, a good rotation, including deep-rooting legumes and fibrous-rooted grasses, should be adopted. A portion of these sod crops should be plowed under to furnish organic matter and increase the supply of available nitrogen.

This soil should respond to fertilizers, but there are no data from experimental fields to confirm this opinion. Rock phosphate applied for alfalfa or the clovers should give satisfactory increases in these crops; and these increases, if part of the crop is plowed under, will in turn increase the yields of the grain crops that follow. Even though rock phosphate is used, it will probably be worth while to use a mixed fertilizer such as 0-10-20 for corn and 0-20-10 for wheat.

Erosion is a minor problem on this soil, but where the slope is 2 percent or more, attention should be given to its control. Contour cultivation, grass

waterways and, in some areas, terraces, in addition to good soil and crop management, are needed for effective erosion control.

Potomac sandy loam, terrace (135)

Potomac sandy loam is a light-colored terrace soil developed under forest vegetation on slopes of 1½ to 3½ percent. It occurs along the bottomlands bordering the larger streams, as Camden silt loam does. In Christian county this soil type occupies a total area of only 250 acres.

Soil profile. The surface soil of this type is a grayish-yellow sandy loam 5 to 8 inches thick. The subsurface is a yellowish sandy loam. The subsoil is a grayish-yellow to yellow slightly plastic sandy clay loam. Below 30 to 40 inches layers of loose sand and gravel occur. Sometimes small areas within Potomac are drouthy.

Use and management. Potomac sandy loam is not a highly productive soil. It requires very good management or yields are likely to be quite low. Its use and management requirements are in general similar to those of Camden silt loam (see page 36), although Potomac occurs in such small areas that it usually has to be cropped along with the adjacent soils. These small areas should, however, be limed and fertilized in amounts which soil tests show are needed.

The more sandy areas of this type are subject to some wind erosion unless they are well protected by good vegetative growth.

Brooklyn silt loam, terrace (136)

Brooklyn silt loam is a medium-dark soil found in shallow depressions on the terraces along South Fork Sangamon and Sangamon rivers. It occurs in association with Littleton silt loam. It has developed under a grass vegetation. It is a minor type in Christian county, occupying only 109 acres. However, because of its slow underdrainage, it is important that it be recognized.

Soil profile. The surface of this type is a brownish-gray friable silt loam 5 to 7 inches thick. The subsurface, which extends to a depth of 18 to 22 inches, is a gray to light-gray ashy silt loam. The subsoil is a compact and plastic clay, very slowly permeable to water, and gray with pale-yellow mottlings.

Use and management. Brooklyn silt loam is acid and low in plant nutrients, but the chief problem in its management is drainage. Tile do no good unless an inlet is installed to let the surface water pass directly into the tile. Since this type usually occurs in depressions that have no surface outlet, drainage by surface ditches is often impractical.

If drainage can be provided by open ditches or tile, Brooklyn can be cropped as are the surrounding soils, but these spots should be limed and fertilized, as needs are indicated by the soil tests.

Shiloh clay loam (138)

Shiloh clay loam is a dark soil found in depressional to nearly level areas throughout the southern part of Christian county, where it occupies a total area of only about 561 acres.

Soil profile. The surface soil varies from

a clay loam to silty clay loam and is 10 to 14 inches thick. It is black when moist but has a slightly grayish cast when dry. The subsurface is a dark-brown silty clay loam. The subsoil, beginning at a depth of 16 to 20 inches, is a dark-gray silty clay loam or silty clay faintly mottled with pale yellow.

Use and management. Shiloh clay loam is neutral or only slightly acid and is relatively well supplied with nitrogen, phosphorus, and potash. Its most serious defect is that it puddles easily if worked when too wet. Frequent additions of fresh organic matter in the form of barnyard manure, green manure, or stand-over legumes will help keep this soil in good physical condition. Fall plowing, or very early spring plowing whenever possible, also helps to keep this soil in good physical condition. Some limestone may occasionally be needed, but the amount needed should be determined by a soil test, as should also the need for phosphate or potash.

Shiloh will tile, but underdrainage is moderately slow and the tile lines should be placed about 5 rods apart. When well drained and managed, Shiloh is a productive soil, and high yields of the grain crops common to the region can be expected.

Breese silt loam (170)

Breese silt loam is a medium-dark soil found between upland forest and prairie soils in the southern half of Christian county. It occurs on very gently sloping areas, where the grade is less than 1½ percent. It is a soil which has been lightly forested. The forests probably covered these areas for too short a time to destroy all the characteristics the prairie vegetation gave the soil. The total area of this type in Christian county is about 1,200 acres.

Soil profile. This soil is intermediate in character between Herrick silt loam and Whitson silt loam. The surface soil is a friable brownish-gray silt loam 6 to 8 inches thick. The subsurface is a brownish-gray to gray silt loam. The lower part of the subsurface tends to be more gray than the upper part. The subsoil begins at a depth of 16 to 18 inches and is a medium-compact and medium-plastic yellowish-gray silty clay stained with grayish-brown organic matter.

Use and management. The use and management problems of Breese silt loam are somewhat similar to those of Whitson silt loam. Breese differs from Whitson in being higher in organic matter, somewhat more permeable to water because of its less-plastic and less-compact subsoil, and probably it is less deficient in phosphate and potash. The effectiveness of tile is questionable. Drainage by furrows and open ditches is probably needed on many areas.

The producing capacity of Breese is intermediate between Herrick and Whitson. Breese should be fertilized in the same way as Whitson (see page 30).

Orio silt loam, terrace (177)

Orio silt loam is a dark soil found on nearly level areas on the terraces along Sangamon and South Fork Sangamon rivers. It occupies 949 acres in Christian county.

Soil profile. The surface 6 to 8 inches is a brown silt loam with a gray cast when dry. The subsurface is a brownish-gray silt loam. In some places the lower part of the subsurface is ashy. The subsoil,

which begins at 18 to 20 inches, is a gray medium-plastic silty clay mottled with brown and yellow. It is slowly to moderately slowly permeable to water. The underlying material is usually silty.

Orio silt loam is similar to Brooklyn silt loam but is more permeable to water and has a darker surface.

Use and management. Orio silt loam, when drained, is moderately productive. Underdrainage is slow to moderately slow and needs to be supplemented by surface ditches. Tile draw very slowly. If they are used, the laterals should be placed close together. After drainage is established, this soil should be tested for acidity and lime applied as needed. Then a rotation should be adopted which has a high percentage of clover, such as corn or soybeans, oats, wheat, and two years of sod. Wheat and soybeans are better adapted to this soil than corn.

After the nitrogen needs of the crops have been taken care of by a rotation with plenty of legumes, tests should be made to determine whether phosphate and potash are also needed. If potash is adequate but phosphate is deficient, the deficiency may be corrected by applying superphosphate or 1,000 to 1,500 pounds of rock phosphate an acre for wheat. If both phosphate and potash are deficient, it is probably advisable to apply a mixed fertilizer high in potash, such as 0-10-20, for corn, and one high in phosphate, such as 0-20-10, for wheat. An alternative plan when both are deficient is to apply rock phosphate and muriate of potash instead of the mixed fertilizer.

Roby fine sandy loam (184)

Roby fine sandy loam is a light-colored soil found on the upland close to the bluffs along the Sangamon river bottom. It has developed under forest vegetation on areas with slopes of 1½ to 7 percent. The sand has been carried here by the wind from the nearby flood plain of Sangamon river. In most areas of this type in Christian county the material is a fine sand, but there are a few places where it is a medium sand. Roby occupies 880 acres in Christian county.

Soil profile. The surface is yellowish-gray fine sandy loam to loamy fine sand 5 to 7 inches thick. There is some variation in the amount of gray coloring present, depending on the degree of slope. The subsurface is a yellowish-gray fine sandy loam. The subsoil begins at a depth of 15 to 20 inches. It is a slightly plastic fine sandy clay loam varying from grayish yellow to yellow. On the steeper slopes within this type, the subsoil has more of a reddish cast.

Many small areas mapped with this type differ from it in that they have a layer of sand at a depth of 15 to 30 inches instead of the sandy clay loam subsoil. It was not possible to show these small areas on the map.

Use and management. Roby fine sandy loam is acid and low in organic matter. It is not well adapted to the grain crops but will produce fair pasture and, if limestone is applied, alfalfa can be grown. It is probable, however, that to get good results with alfalfa, phosphate and potash should both be applied in addition to limestone.

Mixed fertilizers, such as 0-20-20, are advisable in establishing and promoting the growth of sweet clover, alfalfa, and other legume crops on this soil. It is not likely that rock phosphate will give much increase in yields of alfalfa or clover; it is quite certain that grain crops will not respond satisfactorily.

Erosion is not a serious problem on

Roby fine sandy loam because this type is moderately permeable to water. However, on areas where the slope approaches the upper limit for this type, 7 percent, erosion is active unless these areas are kept in pasture or meadow.

Kincaid fine sandy loam (186)

Kincaid fine sandy loam is a light-colored soil found on the upland close to the bluffs along the Sangamon river bottom. It usually occurs on areas with slopes of 7 to 25 percent. It has developed from a coarse loess, a wind-blown silty deposit, mixed with some fine sand. The natural vegetation that once covered these areas was mixed hardwood forest. The total area of Kincaid in Christian county is about 700 acres.

Soil profile. The surface of this type, which is 5 to 7 inches thick, varies from a yellowish-gray loamy fine sand to fine sandy loam. The subsurface is a grayish-yellow loamy fine sand or fine sandy loam. The subsoil, which begins at depths ranging from 15 to 25 inches, is a reddish-yellow fine sandy clay loam.

Scattered through this type are small areas that do not have the fine sandy clay loam subsoil described above. These areas are too small to be shown on the map.

Use and management. Kincaid fine sandy loam is not well adapted to cultivation because of its steep slopes and low water-holding capacity. Where lime is applied and the slopes are not too steep, alfalfa does fairly well. In general, however, this soil can best be used for pasture or for timber.

Onarga fine sandy loam and Hagener loamy fine sand undifferentiated (190-98)

Onarga fine sandy loam (190) and Hagener loamy fine sand (98) are upland types found near the Sangamon river bluffs in the northern part of Christian county. They have developed under grass vegetation on areas with slopes of about 2 to 7 percent. These two soil types occur in such close association that it was not possible to show them separately on a small map. Together they occupy 468 acres in Christian county.

Soil profiles. The surface of Onarga fine sandy loam is a brown to light-brown fine sandy loam 4 to 8 inches thick. The subsurface is a pale reddish-yellow fine sandy loam. The subsoil, which begins at a depth of 14 to 20 inches, is a reddish-yellow fine sandy clay loam that is moderately plastic.

The surface of Hagener loamy fine sand is a light-brown fine sand to loamy fine sand 8 to 20 inches thick. No clay has accumulated in the subsoil, and only a yellow loose fine sand occurs beneath the surface.

Use and management. Hagener loamy fine sand tends to be more drouthy than Onarga fine sandy loam. The areas mapped as containing both these types therefore vary in drouthiness. The small grains, clover, and alfalfa grow better on this association of soils than do corn and soybeans.

Limestone should be applied in amounts indicated by the acidity test as needed. The Oquawka experiment field in Henderson county gives some information that may be used as a guide in fertilizing this association of soils.

Manure applied on that field in amounts equal to the weight of the crops removed has given an average annual increase on limed plots of 6.5 bushels of wheat, 5.5 bushels of rye, 0.84 ton of alfalfa, 9.1 bushels of corn, and 3.6 bushels of soybeans. Rock phosphate, as an average of all phosphate plots, has given no increases in yield in either the manure or the residues system. Potash used in large amounts has given small average increases in yields. The increases for potash, though small, are consistent on nearly all plots and suggest that if similar increases could be obtained with small applications, it would be worth while to use potash for corn or when seeding alfalfa. If the soil tests show that both phosphate and potash are deficient, a mixed fertilizer such as 0-20-20, or 3-9-18, or 0-10-20 would be advisable.

The sandier areas of this soil association drift somewhat with the wind unless protected by good vegetative growth.

Hersman clay loam, terrace (195)

Hersman clay loam is a dark soil found in nearly level or depressional areas on the terraces along South Fork Sangamon and Sangamon rivers. It occurs in association with Littleton silt loam and Alexis silt loam but differs from them as a result of poorer natural drainage. This soil was formed under a swamp-grass vegetation from fine-textured sediments. It occupies only 116 acres in Christian county.

Soil profile. The surface is a granular black clay loam to silty clay loam 8 to 10 inches thick. It is high in organic matter and plant nutrients and usually is sweet. The subsurface is dark grayish-brown silty clay loam. The subsoil, beginning at 16 to 18 inches, is a gray silty clay loam mottled with pale yellow.

Use and management. Hersman clay loam is similar to Illiopolis silty clay loam, and the suggestions for the use and management of that type (see page 24) apply also to Hersman.

Tile draw well in Hersman although good outlets are sometimes hard to provide. This soil is rather heavy, and every effort should be made to keep it in good physical condition. Good rotations that include deep-rooting legumes and fibrous-rooted grasses, cultivation when moisture conditions are right, and fall plowing when possible will help to promote good structure in this soil.

Denny silt loam (245)[1]

Denny silt loam is a grayish upland soil found usually in small depressions in association with Ipava silt loam, Bolivia silt loam, and Tovey silt loam. It is a grayish soil with a very heavy subsoil, occurring usually in small areas among much better soils. Occasionally Denny is found on gentle slopes. It occupies about 3,400 acres in Christian county.

Soil profile. The surface soil is a brownish-gray silt loam 6 to 10 inches thick. The subsurface is a gray to light-gray silt loam 4 to 10 inches thick. It is frequently ashy, especially in the lower part. The subsoil, which occurs at a depth of 14 to 20 inches, is a compact and plastic silty clay, gray in color and mottled with pale yellow. It is very slowly permeable to water.

Use and management. The major problem in the use of Denny silt loam is to

[1] Number 245 is used for Denny silt loam in Christian county only. In other counties number 45 has been used.

provide drainage. It will not tile, but it can be drained by means of furrows and open ditches or surface inlets into the tiling system.

After adequate drainage has been established, Denny silt loam should be limed and fertilized according to its needs as indicated by the soil tests, but it usually has to be cropped the same as the surrounding soils.

Bolivia silt loam (246)

Bolivia silt loam is a dark upland soil developed under a grass vegetation on slopes of 1½ to 3½ percent. It occurs in association with Ipava silt loam and Tovey silt loam. It is an extensive type in the northern half of Christian county, occupying a total area of about 49,000 acres.

Soil profile. The surface is a dark grayish-brown to dark-brown silt loam 7 to 12 inches thick. The subsurface is a yellowish-brown silt loam. The subsoil begins at a depth of 16 to 18 inches and is a silty clay loam. This layer is yellowish brown with dark grayish-brown coatings, and is slightly compact and slightly plastic. It absorbs moisture readily, the entire profile being easily penetrated by moisture and plant roots.

Use and management. The use and management suggestions made for Ipava silt loam, page 19, apply also to Bolivia silt loam. However, because Bolivia occurs on areas that slope more than Ipava, erosion is a more serious problem. Except on the more sloping areas, erosion can be controlled by good soil treatment and crop management. When the slope is greater than about 2 percent, contour tillage and grass waterways are also advised. Some areas are well adapted to terracing and, when such is the case, terraces will help greatly in controlling erosion.

Tovey silt loam (247)

Tovey silt loam is a dark upland soil found in association with Bolivia silt loam and Assumption silt loam. It has developed under grass vegetation on areas sloping 3½ to 7 percent. There are a few places, however, in Township 14 North, Range 1 East, that slope slightly more than 7 percent. Other areas of this type, on the rather flat-topped morainal ridge between Willeys and Taylorville, have slopes of less than 3½ percent. The total area of this type in Christian county is about 14,700 acres.

Soil profile. The surface, which is 5 to 8 inches deep, is a brown to light-brown silt loam. The subsurface is a yellowish-brown silt loam. The subsoil, beginning at about 14 to 16 inches, is a brownish-yellow slightly plastic silty clay loam.

Use and management. Tovey silt loam usually requires limestone and may also require phosphate and potash. As the need for these materials varies from area to area, soil tests should be used as a guide in making applications. The rotation should include a high percentage of legumes in order to provide organic matter and nitrogen and aid in the control of erosion.

Very few areas of this type should be devoted to cultivated crops unless special care is taken to control erosion. The cropping system should be so planned as to provide vegetative protection as much of the time as possible. All cultivation should be done on the contour, and terraces and grass waterways should be used when practicable. This soil gener-

ally has good physical condition, so that, unless the area is too steep, good seedbeds can easily be formed.

There are no experiment-field data bearing directly on the fertilizing of this soil. The limited amount of data for Tama silt loam, which is similar to Tovey in some respects, indicates that if a good cropping system is used on Tovey, rock phosphate should give moderate returns in a grain system of farming. In a livestock system, with manure available, the returns from rock phosphate would probably be very small. Potash, even when used in rather heavy amounts, has given very small crop increases on Tama. It is likely, however, that Tovey is more deficient in potash than is Tama and, if this is true, potash might give significant crop increases on Tovey. It is tentatively suggested that when wheat is grown, superphosphate or a mixed fertilizer high in phosphate, such as 0-20-10, be applied, and when corn is grown, a mixed fertilizer high in potash, such as 0-10-20, be used.

Edinburg silty clay loam (249)

Edinburg silty clay loam is a medium-dark soil developed under grass vegetation. It is found in small depressions usually surrounded by Illiopolis silty clay loam. It occupies a total area of 1,854 acres in Christian county.

Soil profile. The surface soil is a grayish-brown silty clay loam 10 to 12 inches thick. The subsurface is a dark-gray or grayish-brown silty clay loam. The subsoil, which begins at a depth of 16 to 20 inches, is a medium-compact and plastic silty clay loam or silty clay. It is gray in color, has dark grayish-brown coatings on the structure particles, and is weakly mottled with yellow.

Use and management. Since Edinburg silty clay loam occurs in depressions, it often receives surface runoff from surrounding soils. Because of this overflow and also because of slow underdrainage, it often is badly in need of drainage. Underdrainage is slow, but tile sometimes can be used if spaced about 4 rods apart. In many areas furrows can be used, or an open catch basin leading into tile will aid surface drainage.

After drainage has been improved, soil tests should be made and limestone, phosphate, and potash put on in amounts needed. Heavy applications of animal manure give good results. Many areas of this type are small, and usually must be farmed in the same way as the surrounding soils.

Velma loam (250)

Velma loam is an upland prairie soil occurring on strongly sloping to steep areas in association with Tovey silt loam, Harrison silt loam, and Assumption silt loam. Slopes range from 7 to 15 percent or more. This soil has developed from very thin loess (less than 20 inches thick) on weathered Illinoian drift. In Christian county it occupies a total area of about 6,400 acres.

Soil profile. The surface soil is a light grayish-brown silt loam to loam 6 to 10 inches thick. The subsurface is a brownish-yellow loam 6 to 8 inches thick. The subsoil is a brownish-yellow compact and plastic sandy clay. The weathered Illinoian drift which underlies the subsoil may be gravelly but frequently is heavy and compact. There is considerable variation in this type, the varia-

tions depending on the thickness of the silty cover that remains on the weathered drift and also on the texture of the drift itself.

Use and management. Velma loam is not adapted to cultivation, but is best used for hay and pasture. Some fertilizing, particularly with lime and phosphate, is necessary for good pasture, including legumes. After limestone and phosphate have been applied, a mixture of alfalfa and timothy or alfalfa and bromegrass makes an excellent combination for hay or pasture.

Owaneco silt loam and Harvel silty clay loam undifferentiated (251-252)

Owaneco silt loam (251) and Harvel silty clay loam (252) are upland soils that occur in small depressions in association with Virden silty clay loam, Herrick silt loam, and Harrison silt loam. Both Owaneco and Harvel have developed under wet-prairie or swamp-grass vegetation. They occur in such close association that it is not possible to show them separately on the map. Together they occupy 949 acres in Christian county.

Soil profiles. The surface of Owaneco silt loam is a brownish-gray silt loam 8 to 10 inches thick. The subsurface is also a silt loam, but it is more gray than the surface and is often heavily mottled with rusty yellow. The subsoil, beginning at a depth of about 18 inches, is a silty clay to clay. It is gray and heavily mottled with rusty yellow. The rusty mottlings are due to an unusually large quantity of iron compounds in the subsurface and subsoil. Because of the heavy, compact and plastic subsoil, underdrainage is slow.

Harvel silty clay loam has a grayish-brown silty clay loam surface 10 to 12 inches thick. The subsurface is a gray heavy silt loam. The subsoil, which begins at a depth of about 14 to 18 inches, is a gray to light-gray silt loam, easily pulverized and nonsticky. Underdrainage is moderately slow.

Use and management. Owaneco silt loam and Harvel silty clay loam usually occur in small areas and must be farmed in the same way as the surrounding soils. Where drainage has not been provided, these soils frequently are wet late into the spring. The two best means of draining them, especially where Owaneco silt loam predominates, are by using a catch basin leading into the tiling system or by means of open ditches and furrows. If Harvel occurred by itself it could be tile-drained. When drainage can be improved on either of these types, soil treatment is probably justified. The use of limestone, phosphate, and potash should be based on soil tests.

Stonington loam, terrace (253)

Stonington loam is a light-colored terrace soil developed under forest vegetation on areas that slope more than 4 percent. It is found on the steeper portions of the terraces, usually between Camden silt loam and the bottomlands. It occupies a total area of 335 acres in Christian county.

Soil profile. The soil profile of Stonington is variable. On the steeper portions, erosion has often been so rapid that the underlying alluvial sands and gravels are

exposed. On the gentler slopes the surface soil is a yellowish-gray silt loam to loam 4 to 6 inches thick. The subsurface is more yellowish than the surface and grades into layers of loose sand and gravel at a depth of 15 to 25 inches. In areas where erosion has not been severe, there is a weakly developed clay loam subsoil.

Use and management. Stonington loam, for the most part, is not adapted to cultivation. The gentler slopes may be used for meadow or pasture; the steeper portions should be devoted to timber. Where the underlying sand or gravel is exposed, drouthy conditions are likely to be found. The problems met in establishing trees on such areas are similar to those encountered on eroded Hickory gravelly loam (see page 16).

Hartsburg silty clay loam (254)[1]

Hartsburg silty clay loam is a dark upland soil found on nearly level to depressional areas that were very swampy before artificial drainage was provided. It occurs mainly in association with Illiopolis silty clay loam and Virden silty clay loam. Those areas of Hartsburg occurring in the southern part of the county near Virden silty clay loam are somewhat more highly weathered and more deeply leached of lime than are those occurring farther north in the county near Illiopolis silty clay loam. Hartsburg occupies a total area of about 22,000 acres in Christian county.

[1] Number 254 is used for Hartsburg silty clay loam in Christian county only. In other counties number 244 has been used.

Soil profile. The surface soil is a dark grayish-brown to grayish-black silty clay loam about 10 inches thick. The subsurface is a grayish-brown silty clay loam. The subsoil, which begins at a depth of 15 to 18 inches, is a grayish-brown silty clay loam that is mixed with pale yellow. It is permeable to water and to plant roots. Lime concretions (small gravel-like lumps of limestone) may or may not be present in the surface soil, but they usually are present in the lower part of the subsoil at 25 to 30 inches.

Corn and soybeans do well on Hartsburg silty clay loam, as these thrifty fields show. Hartsburg is an extensive soil in Christian county. If it is well drained and well farmed, this soil type is highly productive. Fig. 6

Use and management. Hartsburg silty clay loam tiles readily when suitable outlets, such as dredged ditches, are established. It is a heavy soil and is easily injured if worked when too wet. This is particularly true of the subsurface, where a compacted layer, or plowsole, develops if plowing is done when the subsurface is too moist. Careful tillage, together with a rotation that includes deep-rooting legumes and fibrous-rooted grasses, prevents the development of this unfavorable condition in the subsurface. Fall plowing is advisable on this soil, as moisture conditions for plowing are usually better in fall than in spring.

This soil rarely needs lime. Acidity tests should always be made, however, to determine whether lime is needed, for, if the soil is sweet, applications of lime would probably lower the yields.

On Hartsburg silty clay loam on the former Virginia experiment field in Cass county, bone phosphate in the manure system gave an average increase of 5.7 bushels of corn, 3.6 bushels of oats, and 0.43 ton of clover hay. In the residues system the increases were 10.1 bushels of corn, 7.6 bushels of oats, and 0.23 ton of clover hay. These results indicate that any soluble phosphate, such as superphosphate, would give corresponding increases on the same soil type in Christian county.

Potash on the Virginia field failed to give yield increases comparable to those produced by bone phosphate. In the manure system it caused no increase in the yield of corn but produced 5.7 bushels more oats and 0.3 ton more clover hay. In the residues system it increased corn yields by 0.5 bushel but there was a loss of 2.3 bushels of oats and 0.24 ton of clover.

The results from the Virginia field suggest that Hartsburg in Christian county be treated with limestone only if the tests show an acid condition, and that superphosphate be used for corn and wheat. On this soil type the supplies of nitrogen and organic matter should also be increased, for the use of superphosphate alone is likely to give disappointing results.

Vanderville silt loam (255)

Vanderville silt loam is a medium-dark soil occurring in the upland in the southern half of Christian county. It is a lightly forested soil and, like Breese silt loam, is usually found between forest and prairie soils. It often occurs in association with Breese silt loam but occupies more marked slopes, Vanderville slopes having gradients of 1½ to 3½ percent. The total area of Vanderville in Christian county is about 2,200 acres.

Soil profile. In character and in productivity this soil is intermediate between Harrison silt loam and Bogota silt loam. The surface is a brownish-gray to yellowish-gray silt loam about 6 inches thick. The subsurface is a dark-gray to yellowish-gray silt loam. The subsoil, which begins at a depth of about 18 inches, is a grayish-yellow moderately compact and plastic silty clay loam.

Use and management. The use and management problems of Vanderville silt loam are similar to those of Bogota silt loam, page 30. The recommendations made for Bogota apply as well to Vanderville. However, after Vanderville is well fertilized and good soil and crop management is established, its productive level should be somewhat higher than that of Bogota. Erosion can be controlled on the more sloping areas of Vanderville by the methods described for Bogota silt loam, page 30.

Pana silt loam (256)

Pana silt loam is a light-brown soil developed under prairie vegetation on areas with strong slopes, ranging from 7 to 15 percent. It occurs mainly in association with Douglas silt loam on knolls and ridges in the vicinity of Pana in the southeastern part of Christian county. It covers a total area of 456 acres.

Soil profile. Pana silt loam has developed from a thin loess covering on weathered gravelly Illinoian drift. The thickness of the loess, a silty wind-blown deposit, varies from a very few inches to 20 inches. The surface soil is a light-brown silt loam 6 to 8 inches thick. Where very little loess remains, the surface is more of a gravelly loam than a silt loam. The subsurface is not very distinct but is somewhat more yellowish than the surface. The subsoil, which is developed partly in the underlying drift, is a reddish-brown gravelly loam to clay loam. It is usually friable, easily crushed and, where exposed by erosion, can be cultivated although it is not so easy to work as the loess-derived silty material.

Use and management. Pana silt loam is better adapted to pasture and meadow than to tilled crops. The least sloping and least eroded portions of the type may, however, be used for a long rotation that includes a high proportion of legumes and grasses and small grains. Corn is not a good crop for this soil. When limed and fertilized so as to correct deficiencies indicated by the soil tests, this soil is adapted to alfalfa. Mixtures of alfalfa and timothy or alfalfa and brome are better than alfalfa alone because they control erosion more effectively. If this soil type is pastured, overgrazing should be avoided; otherwise gully erosion is likely to become serious.

Clarksdale silt loam (257)

Clarksdale silt loam is a medium-dark upland soil found in the north half of Christian county. It occurs usually between forest and prairie soils on slopes of less than 1½ percent. The forests probably covered these areas for too short a time to entirely change the features imparted to the soil by the grass vegetation. In character this type is between Ipava and Whitson silt loams. It occupies about 1,200 acres in this county.

Soil profile. The surface soil is a brownish-gray silt loam 6 to 8 inches thick. The subsurface is a brownish-gray to gray silt loam. The lower part of the subsurface is sometimes somewhat ashy. The subsoil, which begins at a depth of about 18 inches, is a yellowish-gray medium-compact and plastic silty clay loam or silty clay.

Use and management. The use and management problems of Clarksdale silt loam are somewhat similar to those of Ipava silt loam, page 19. Clarksdale, however, does not underdrain as freely as Ipava, and the use of tile for draining this soil is questionable. Clarksdale is more acid, is lower in organic matter and nitrogen, and probably is lower also in phosphate and potash than Ipava.

There are no experiment-field data bearing directly on the fertilizing of Clarksdale. The soil tests should be made, limestone applied as needed, and a good rotation adopted that will provide for nitrogen and organic matter. So far as now known, the recommendations made for Ipava silt loam, page 19, apply to Clarksdale, but Clarksdale will probably produce a little less than Ipava.

Sicily silt loam (258)

Sicily silt loam is a medium-dark upland soil occurring in the northern half of Christian county, usually between forest and prairie soils. It has developed on slopes of 1½ to 3½ percent under forest vegetation. The forest vegetation, however, has not occupied these areas long enough to change entirely the characteristics that an earlier stand of prairie grass gave to the soil. This type is intermediate in character between Bolivia and Bogota silt loams. It occupies about 3,400 acres in Christian county.

Soil profile. The surface soil is a brownish-gray to grayish-brown silt loam 6 to 8 inches thick. It is mellow and easily worked. The subsurface is a silt loam and varies in color from brownish gray to gray. The subsoil, beginning at about 18 inches, is mixed brownish yellow and gray, with dark coatings on the structure particles. It is a medium-compact and plastic silty clay loam.

Use and management. Sicily silt loam requires limestone, phosphate, and potash to produce good crops. Applications of these materials should be based on soil tests. After liming has been done, a good rotation that includes deep-rooting legumes and fibrous-rooted grasses should be adopted in order to furnish organic matter and nitrogen and to help keep the soil in good physical condition. Several rotations that provide a standover sod crop are suggested on page 12.

The suggestions made for the fertilizing of Bolivia (see page 42) are believed to apply to Sicily, although the productive level of Sicily is a little lower than that of Bolivia.

Good soil treatment and crop management, together with contour tillage and grass waterways on the more sloping areas, will usually control erosion on this soil. In some areas terraces may also be needed.

Assumption silt loam (259)

Assumption silt loam is an upland prairie soil occurring on moderately to strongly sloping areas in the northern two-thirds of Christian county. Slopes vary from 5 to 10 percent. It occurs in association with Tovey silt loam, Harrison silt loam, and Velma loam. The total area of Assumption in Christian county is about 3,600 acres.

Soil profile. The depth of the loess, a silty wind-blown deposit, from which this type has developed varies from about 20 to 40 inches. The surface is a light-brown silt loam 6 to 8 inches thick. The subsurface is a brownish-yellow silt loam 4 to 8 inches thick. The subsoil, beginning at a depth of 10 to 14 inches, is a brownish-yellow moderately plastic silty clay loam. The weathered Illinoian till which usually underlies the subsoil at a depth of 20 to 40 inches varies in character from an easily crushed pebbly till to a heavy "gumbotil." Where it is gumbotil, it restricts underdrainage and thus increases the amount of surface runoff. This in turn increases the danger of erosion.

Use and management. Many areas of Assumption silt loam, particularly those that slope more than 7 or 8 percent, should be used for hay and pasture rather than for cultivated crops.

The suggestions made for the use and management of Douglas silt loam (see page 35) apply also to Assumption silt loam.

Dunkel silt loam (260)

Dunkel silt loam is a light-colored upland prairie soil usually found in small depressional to nearly level areas in association with Herrick silt loam and Harrison silt loam. It occupies about 5,500 acres in Christian county. A few areas that are included with this soil type in Christian county have very gentle slopes.

Soil profile. The surface soil is a gray silt loam 6 to 7 inches thick. It is acid, very low in organic matter, and tends to be floury when dry. The subsurface is a light-gray to gray ashy silt loam. The subsoil, which begins at a depth of 16 to 20 inches, is a compact and plastic clay that is very slowly permeable to water. It is mixed gray and yellow with some rusty-brown spots.

Use and management. The use and management suggestions made for Denny silt loam, page 41, apply also to Dunkel silt loam. These two types are similar, but Dunkel is more leached and weathered and is not as productive as Denny.

Hickory sandy loam (264)

Hickory sandy loam is an upland soil found on steep slopes which usually exceed 15 percent. It is now or was formerly covered with a mixed hardwood forest. In Christian county it is found on the steeper slopes that border the South Fork Sangamon river bottom near Taylorville. Its total area in the county is about 1,100 acres.

Soil profile. This type occurs in an area in which the underlying Illinoian drift is sandy. This sand is thought to be glacial outwash. It varies in thickness from about 4 feet to more than 15 feet. On the flats and very gentle slopes there is about 85 inches of loess on top of the sand, and it is only on the steeper and longer slopes that the sand is exposed. Erosion has been so rapid on these steeper slopes that little or no development of horizons has taken place within the soil profile. In most places enough fine material has been mixed with the sand to give the surface a sandy loam texture.

The color of the surface is grayish yellow. Below about 10 inches the material is more grayish and may be almost pure sand or a mixture of clay and sand.

Use and management. Because of its sandy nature and steep slopes, this type is subject to severe erosion unless protected by a good vegetative growth. It is not adapted to cultivation, and it is doubtful if it should be used even for pasture. Its best use is for timber, though the task of establishing new tree growth on deforested areas is sometimes difficult.

For suggestions on reforestation, including methods of planting, varieties for various purposes, and costs and returns, write for Circular 567, "Forest Planting on Illinois Farms."

SUMMARY OF CHARACTERISTICS OF CHRISTIAN COUNT

A summary of the agriculturally more significant characteristics of the soil types shown on the soil map is given in Table 8. The information in this table is necessarily general and should not be taken to mean that every farm or field of a given soil type exhibits exactly the same characteristics as here indicated. As already pointed out, productivity varies within areas of the same type because of differences in past management. For that reason each field should be studied by the operator. These differences cannot always be detected by the soil surveyor but can be detected by the farmer operating the land. By supplementing the use and management suggestions with his special knowledge, an operator should be able to plan a good soil-management and cropping program for each of the soils on his farm.

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Table 8. — CHRISTIAN COUNTY SOILS: Summary of Characteristics o

Type No.	Type name	See page[a]	Topography[b]	Permeability of subsoil[c]	Organic matter	Workability
8	Hickory gravelly loam	16	Strongly sloping to steep	Slow	Low	Too stee
13	Bluford silt loam	16	Gently sloping	Very slow	Low	Good
14	Ava silt loam	18	Moderately sloping	Very slow to slow	Low	Good
43	Ipava silt loam	19	Very gently sloping	Moderate	High	Good
46	Herrick silt loam	21	Very gently sloping	Moderately slow	Medium	Good
48	Ebbert silt loam	22	Depressional to nearly level	Slow	Medium	Good
50	Virden silty clay loam	23	Nearly level to depressional	Moderately slow	Medium to high	Fair
65	Illiopolis silty clay loam	24	Nearly level to depressional	Moderate	High	Fair
72	Sharon loam, bottom	25	Nearly level	Moderate	Low to medium	Good
74	Radford silt loam, bottom	25	Nearly level	Moderate	Medium	Good
80	Alexis silt loam, terrace	26	Moderately sloping	Moderate	Medium	Good
81	Littleton silt loam, terrace	26	Very gently to gently sloping	Moderate	Medium to high	Good
87	Sumner sandy loam, terrace	26	Gently sloping	Moderate	Low	Good
98	Hagener loamy fine sand	40	Gently to moderately sloping	Very rapid	Low	Good
99	Vance silt loam, rolling phase	27	Strongly sloping to steep	Moderate	Low	Fair but
102	LaHogue loam	27	Nearly level to very gently sloping	Moderate	Medium to high	Good
107	Sawmill clay loam, bottom	28	Nearly level	Moderate to moderately slow	High	Fair
112	Cowden silt loam	28	Very gently sloping	Very slow	Low	Good
113	Oconee silt loam	29	Gently sloping	Very slow	Low	Good

(Table is concluded on next page)

Table 8. — Concluded

Type No.	Type name	See page[a]	Topography[b]	Permeability of subsoil[c]	Organic matter	Workability
116	Whitson silt loam	30	Nearly level to very gently sloping	Very slow	Low	Good
117	Bogota silt loam	30	Gently sloping	Slow	Low	Good
118	Alma silt loam	31	Moderately sloping	Moderate	Low	Good
119	Elco silt loam	32	Moderately to strongly sloping	Moderate	Low	Fair but
120	Slick spot	32	Depressional to nearly level	Very slow	Very low	Fair
127	Harrison silt loam	34	Gently sloping	Moderately slow	Medium	Good
128	Douglas silt loam	35	Moderately sloping	Moderately slow	Medium to low	Good
134	Camden silt loam, terrace	36	Gently sloping	Moderately slow	Low	Good
135	Potomac sandy loam, terrace	37	Gently sloping	Moderate	Low	Good
136	Brooklyn silt loam, terrace	37	Depressional to nearly level	Very slow	Low to medium	Fair
138	Shiloh clay loam	37	Depressional to nearly level	Moderately slow	Medium to high	Fair
170	Breese silt loam	38	Very gently sloping	Slow	Low	Good
177	Orio silt loam, terrace	38	Nearly level	Slow to moderately slow	Medium	Fair
184	Roby fine sandy loam	39	Gently to moderately sloping	Moderate	Low	Good
186	Kincaid fine sandy loam	40	Strongly sloping to steep	Moderately rapid to very rapid	Low	Good bu
190	Onarga fine sandy loam	40	Gently to moderately sloping	Moderate	Low	Good
195	Hersman clay loam, terrace	41	Nearly level to depressional	Moderate	High	Fair to g
245	Denny silt loam (45)	41	Depressional to nearly level	Very slow	Low to medium	Fair
246	Bolivia silt loam	42	Gently sloping	Moderate	Medium to high	Good
247	Tovey silt loam	42	Moderately sloping	Moderate	Medium	Good
249	Edinburg silty clay loam	43	Depressional	Slow	Medium	Fair
250	Velma loam	43	Strongly sloping to steep	Very slow	Low to medium	Fair but
251	Owaneco silt loam	44	Depressional	Slow	Low to medium	Fair
252	Harvel silty clay loam	44	Depressional	Moderately slow	Medium	Fair
253	Stonington loam, terrace	44	Moderately to strongly sloping	Moderately rapid	Low	Poor to
254	Hartsburg silty clay loam (244)	45	Nearly level to depressional	Moderate	Medium	Fair
255	Vanderville silt loam	46	Gently sloping	Slow	Low	Good
256	Pana silt loam	47	Strongly sloping	Moderately rapid	Low	Good
257	Clarksdale silt loam	47	Very gently sloping	Slow	Low	Good
258	Sicily silt loam	48	Gently sloping	Moderately slow to slow	Low	Good
259	Assumption silt loam	48	Moderately to strongly sloping	Moderately slow	Medium	Fair to g
260	Dunkel silt loam	49	Depressional to nearly level	Very slow	Very low	Fair
264	Hickory sandy loam	49	Steep	Moderate	Low	Too stee

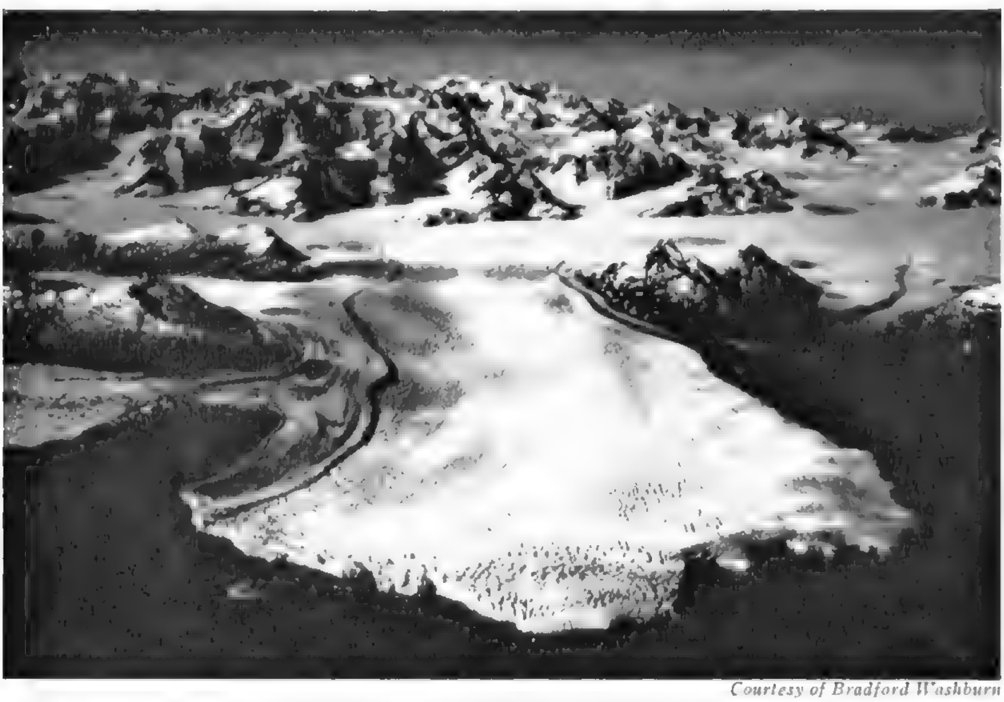
[a] For descriptions of soil types turn to pages indicated.
[b] Topography is expressed by the following terms: *depressional*, *nearly level*, less than 0.5 percent slope; *very gently sloping*, 0.5 to 1.5 perc *sloping*, 3.5 to 7 percent; *strongly sloping*, 7 to 15 percent; *steep*, greater than 15 percent.
[c] Of the terms used, *moderate* expresses the most desirable drainage.
[d] *Workability* is dependent on texture, organic-matter content, and structure of the surface horizon, as well as on slope and drainage.
[e] *Tendency to erode* means susceptibility to water erosion when cultivated. Wind erosion is indicated only where it is a hazard.

HOW CHRISTIAN COUNTY SOILS WERE FORMED

The intelligent use and management of the soils in Christian county does not depend on a knowledge of the origin of the materials from which the soils of the county developed nor on the processes active in their development. Many people, however, are interested in an explanation of facts as well as in the facts themselves. The following brief discussion is intended to bring out these interesting points.

Origin of soil materials. The nature of Christian county soils and the way in which they are distributed are the result of two things: the nature of the parent materials and the conditions under which these soils later developed. The upland and the terrace soils are derived from materials that were laid down during and immediately following the times when great glaciers reached this area. Some of the terrace materials have probably been reworked by both wind and water since the earlier period. The bottomland soils have been formed from sediment deposited in fairly recent times. Sangamon and South Fork Sangamon rivers, as well as the smaller streams of the county, overflow their banks frequently. Some of the bottom areas are thus still receiving deposits of waterborne sediment.

During the time known as the Glacial



Courtesy of Bradford Washburn

This picture of the Columbia glacier in Alaska illustrates how glaciers form and move. Note that the small valley glaciers in the background have joined together into a large glacier in the foreground. This larger glacier is pushing into Prince William sound. The dark streaks are glacial till imbedded in the ice. This glacier is very small compared with the ice sheets that covered most of Illinois in past ages. Fig. 7

Epoch the climate alternated between long periods when it was much like our climate today and other periods of prolonged cold. In the colder periods the average temperature was so low that the snow which fell in winter did not entirely melt the following summer. Enormous amounts of snow and ice eventually piled up in the northern parts of our continent. The pressures developed in this great ice mass caused it to move outward, forming glaciers. This movement continued until the glaciers reached a region where the climate was warm enough to melt the ice as rapidly as it advanced. Fig. 7 shows a small Alaskan glacier which is still active.

In moving across the country, these sheets of ice picked up masses of rock, gravel, sand, silt, and clay, ground them together, and sometimes carried them for hundreds of miles. The moving ice leveled off hills and filled old valleys, often changing completely the features of the surface over which it passed. The deposits of rock material left by the glaciers are known as glacial drift and glacial till, terms which appear frequently in descriptions of soils.

Two of the glacial advances contributed materials to Christian county soils. The Illinoian ice sheet covered the entire county. Long after the Illinoian ice disappeared, the Wisconsin ice sheet, the last great ice movement, approached to within a few miles of the northeast corner of the county. This last ice sheet, however, covered the headwaters of Sangamon and Illinois rivers, and its melting sent tremendous quantities of water draining through these rivers, depositing sediments along the river bottoms.

Throughout the long period during which the Wisconsin ice sheet was melting there were yearly temperature changes as well as long-time mild and cold stages. Varying quantities of water therefore poured down Illinois and Sangamon rivers. During the colder spells when the melting of the ice was checked, the bottoms became dry mud flats. When these flats were exposed to the action of winds, the fine silt sediments were blown into the air and deposited on the upland. Fig. 8 shows how a windstorm picks up the "dust" from bare, dry fields. The wind sorts this dust into particles of different size and deposits the sand particles (the larger ones) close by and the silt (which is fine) farther away. The silty deposit, called "loess," contains a considerable amount of carbonates of calcium and magnesium. The depth of loess in Christian county varies from about 10 feet in the northwestern part of the county to about 4 or 5 feet in the southeastern part.

The soil materials of Christian county can be separated into several groups, as shown in Fig. 9, page 57, and discussed on pages 55 and 56.

How the soils were developed. As soon as the parent materials from which our soils were derived were laid down, they were subjected to various weathering forces, and the processes of soil development began. When first deposited, these parent materials were high in lime and the mineral elements of plant food but were very low in nitrogen. As time elapsed the rain water, the oxygen and carbon dioxide of the air, and the products of decaying plant and animal remains attacked the minerals, leaching out the free lime and changing some of the minerals into clay.

Weathering forces are most active near the surface. Various stages or degrees of weathering therefore occur at different depths. Lime is leached first from the surface, and it is also there that decomposition of the minerals is most active. Most of the organic matter accumulates near the surface. The clay particles that form near the surface are

carried down by the percolating water and accumulate in the subsoil. Thus horizons, or layers, differing in physical and chemical composition are formed, and the parent material acquires the characteristics of soil.

The kind of vegetation under which the soils of Christian county have developed has influenced markedly the amount of organic matter which they contain. The prairie and swamp grasses, through their extensive fibrous root systems, have added much organic matter to the soil.

Forest vegetation, on the other hand, adds little organic matter to the soil. The twigs and leaves lie on the surface, where they oxidize readily. Moreover the roots of trees are coarse and few, and hence do not add much organic matter. In the swampy timber areas in the bottoms the soil has acquired a fair supply of organic matter from the sediments deposited by floodwaters and from the undergrowth, which is preserved by the swamp conditions.

Drainage and the slope of the land surface are responsible for certain other characteristics in a soil. The poorly drained soils in the depressions are gray, though the color may be masked by the darker organic matter. The soils developed under good drainage, on the other hand, are yellowish or reddish, though again the color of the surface horizon may be modified by the organic matter present.

Each horizon has more or less definite characteristics. These horizons are designated as *surface, subsurface,* and *subsoil* in the descriptions. The *surface* horizon is usually the layer where the greatest amount of organic matter has accumulated. The *subsurface,* in soils which have not weathered much, is usually a transition between the surface and the subsoil; in soils that have undergone considerable weathering, it may be a bleached gray, low in plant nutrients and organic matter. Clay usually accumulates in the *subsoil,* making this layer more plastic and sticky than either the

Loess in the making. The upland soils of Christian county owe their productiveness largely to the silty wind-blown material, called loess, deposited during and near the close of the ice age by dust storms like this one. The Illinois and Sangamon river flood plains were the sources of most of the dust that was blown out over the upland of Christian county and deposited as loess. ***(This picture was taken in Texas in the spring of 1935 by the U. S. Soil Conservation Service.)*** **Fig. 8**

surface or the subsurface. Water is likely to move slowly through this layer. This condition is generally more pronounced in soils that have undergone considerable weathering.

All these zones, or horizons, taken together make up the "soil profile." Differences in the arrangement, color, and thickness of the various zones, or in any other of their physical features or in their chemical content, are the bases upon which soil types are differentiated and the soil map constructed. Photographs of two contrasting soil profiles, Ipava silt loam and Herrick silt loam, are shown in Fig. 2 on page 5.

GROUPING OF THE SOILS OF CHRISTIAN COUNTY

Fifty-two soil types have been identified in Christian county and are shown on the soil map. Anyone who needs to become familiar with all the soil types in this county will find it helpful to get an understanding of the relations between the different ones. Table 9 and Fig. 9, in addition to Fig. 3 on page 6, will help make these relations clear.

The upland soils. The upland soils are shown in Fig. 9 in three major groups numbered 1 (1A, 1B, 1C), 2, and 3. The soils of Group 1B have developed from loess which is 7 to 10 feet thick. The small areas, 1A and 1C, differ from the large area, 1B, in that they are underlain by sand at a depth of 40 to 60 inches. The soils in Group 1 are the least weathered soils in the county and have less strongly developed subsoils than the soils farther south.

The soils in Group 2 have developed from loess 5 to 7 feet thick. These soils have been more strongly weathered and leached, and they have more strongly developed subsoils than the soils farther north.

The soils in Group 3 have developed from loess 4 to 5 feet thick, and are the most strongly weathered and leached soils in the county. They are claypan soils, and water moves only slowly through them.

The agricultural significance of the above grouping is that from north to south in Christian county the soils increase in the amount of weathering and leaching they have undergone. Associated with this increase in weathering and leaching is a corresponding development of the subsoil. Consequently moisture moves through the soil less freely and it is less practicable to use tile.

Soils that developed under timber vegetation and sandy soils are not shown separately in Fig. 9 because the total area of such soils is small. As indicated in Table 9, one sequence of timber soils was mapped with Groups 1 and 2 of the prairie soils and a second sequence was mapped with Group 3 of the prairie soils. The sandy soils occur mainly in small scattered areas near the Sangamon river bottom in the northern part of the county.

The terrace and bottomland soils. Because of the small scale of this map, the terrace and bottomland soils, though distinct, are grouped together as Group 4 in Fig. 9. The terrace soils that were developed under grass have been weathered and leached enough so they now have moderately developed profiles similar to those in Group 1; but the bottomland soils, being formed from many different and recently deposited parent materials, have not developed such profiles.

Table 9. — CHRISTIAN COUNTY SOILS

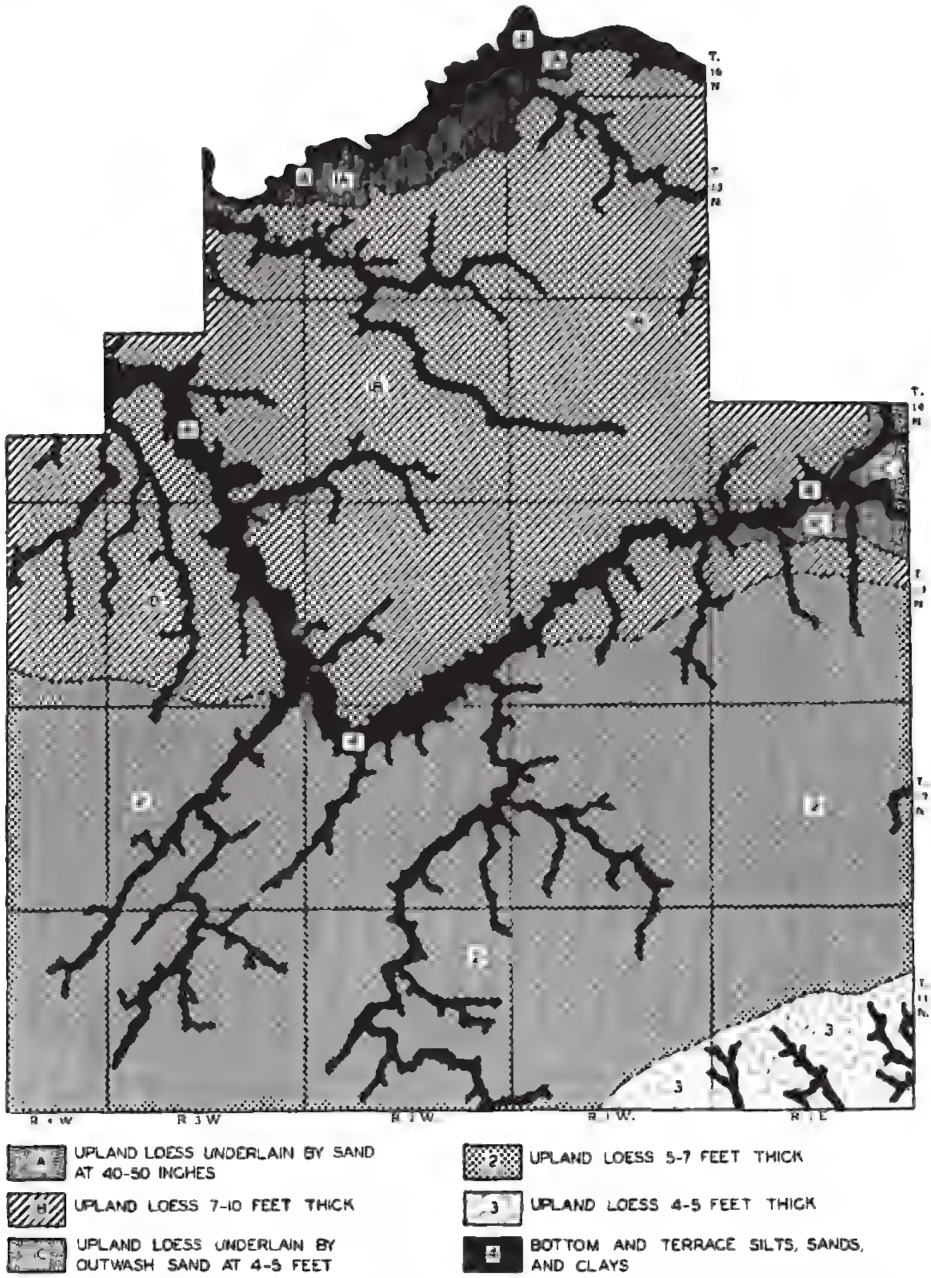
Grouped According to Parent Materials, Vegetation, and Draina

Parent materials	Soil group	Depth of parent materials on uneroded topography	Vegetation	TYPES WITH SIMILAR SLOPE AND DRAINAGE D				
				Depressional areas		Slope 0.5-1.5% Drainage slow	Slope 1.5-3.5% Drainage moderate	I m
				Dark soils, water table high	Light soils, water table variable			
UPLAND SOILS								
Loess, silty	**1A, 1B, 1C**	7-10 ft.[b]	Prairie	**254, 65**	**249, 245**	**43**	**246**	
			Prairie-timber[c]	......	....	**257**	**258**	
			Timber	......	....	**116**	**117**	
	2	5-7 ft.	Prairie	**254, 50, 252, 138, 48**	**260, 120, 251**	**46**	**127**	
			Prairie-timber[c]	......	....	**170**	**255**	
			Timber	......	....	**116**	**117**	
	3	4-5 ft.	Prairie	**138, 48**	**120**	**112**	**113**	
			Timber	......	....	...	**13**	
Mixed sand, silt, and clay	**1A, 1C**	Over 7 ft.	Prairie	......	....	**102**	**190, 98**	
			Timber	......	....	...	**184**	
TERRACE SOILS								
Silts over sand or gravel	**4**	Over 3 ft.	Prairie	**195**	**136, 177**	**81**	**81**	
			Timber	......	....	...	**134**	
Mixed sand, silt, and clay over sand or gravel	**4**	Over 3 ft.	Prairie	......	....	...	**87**	
			Timber	......	....	...	**135**	

[a] Bottomland soils (Types 72, 74, and 107) are not included in this table because they do not fit into any of th

[b] The small areas, 1A and 1C, differ from the large area, 1B, in that the silty loess covering of 1A and 1C is rather than 7 to 10 feet thick, as in Area 1B.

[c] "Prairie-timber" indicates a condition where timber has invaded a prairie area but has not yet changed entirel under the grass vegetation.



Two important things to know about soils to be used for farming in Christian county are whether or not they underdrain freely and how deep is the loess from which they were developed. To the north and northwest of the county in Areas 1A, 1B, and 1C, the loess is deep and the major soil types underdrain well. Areas 1A and 1C differ from 1B in being underlain by sand. In Area 2 the loess is *not* so deep, the soils are grayer, and they underdrain less freely than those to the north. In Area 3, where the loess is thin, soils with a claypan subsoil occur and underdrainage is slow or impossible. Fig. 9

GEOGRAPHICAL AND HISTORICAL FEATURES

Physiography and drainage. Most of Christian county is characterized by nearly level to gently sloping topography. A large part of the county is essentially a flat plain that has been partially dissected by headwater erosion of numerous streams and drainage ways.

Besides the more rolling areas adjacent to streams there are three somewhat separate rolling morainal areas in the county. Mount Auburn, in the northern part of the county, is located on one of several morainal hills and ridges in that vicinity. In the east-central part a more or less continuous ridge extends from Taylorville northeastward to the county line 5 or 6 miles east of Stonington. This ridge is relatively low near Taylorville but becomes more prominent farther to the northeast. It is, in general, less than three-quarters of a mile in width. In the southeastern part of the county the most prominent ridge extends from the county line east of Pana to the county line southwest of Rosamond. In most places this ridge is ½ to 1½ miles wide and divides the drainage of the county; south of the ridge the land drains into Kaskaskia river, and the rest of the county drains into Sangamon river.

Rather extensive bottom and terrace lowlands occur along Sangamon river, South Fork Sangamon, and Flat Branch.

In the more nearly level sections of the county there are areas of flat land that require artificial drainage before they can be cultivated successfully. Except for some areas in the southeastern corner of the county, most of the flatter prairie land can be tiled successfully. In parts of the southeastern corner of the county where the subsoils are, for the most part, only very slowly permeable to water, tile do not draw fast enough to be satisfactory. The best way to drain these areas is by open ditches or furrows.

In the more rolling areas, where surface drainage is fairly rapid, very little artificial drainage is needed. In fact, it is frequently necessary to take steps to prevent the rapid runoff from causing serious erosion.

The drainage of the bottom and terrace lowlands is variable. Some of the terrace soils have excessive underdrainage whereas some of the bottomlands are swampy and frequently flooded.

Most of the upland of Christian county lies between 580 and 700 feet above sea level and about 50 to 100 feet above the bottomland. The altitude at Taylorville is 620 feet above sea level.

Climate of Christian county. The humid, temperate climate of Christian county varies greatly between the extremes of winter and summer. At the Pana weather station in the southeastern part of the county the highest temperature recorded during the years 1920 through 1945 was 110° F., the lowest −24° F. The mean annual temperature was 54.4° F. The mean July temperature was 77.7° F. and the mean January temperature was 29.8° F.

The average date of the last killing frost from 1920 through 1945 was April 25, and the average date for the earliest killing frost in the fall was October 19. Thus the average frost-free season was 176 days. The shortest growing season during these twenty-six years was 138 days in 1925, and the longest was 214 days in 1941. The average growing season gives ample time to mature the crops commonly grown, although frosts occasionally catch corn and soybeans before they have fully matured.

The annual precipitation (amount of rain, and of snow and sleet in terms of rain) recorded at the Pana weather station from 1920 to 1945 averaged 37.0

inches, ranging, however, from 25.06 inches in 1930 to 57.28 inches in 1927. The yearly snowfall averaged 15 inches.

Of much greater interest to farmers than the annual precipitation is the amount and distribution of rainfall during the growing season. From April through September the amount has ranged from 11.62 inches in 1930 to 35.20 inches in 1927 and has averaged 22.2 inches. Rainless periods of 10 to 20 days occur during these months nearly every year. If these rainless periods follow other periods of little rain, the effect on the crop may be serious, especially on soils that cannot absorb and retain moisture well.

Important as amount and distribution of rainfall are to crops, their importance is altered by a number of other conditions. Among these other conditions are (1) the temperature of the atmosphere and the amount of evaporation taking place, (2) the capacity of the soil to absorb and retain moisture, and (3) the growth-stage of the crop and the reaction of the crop to drouth.

Settlement of Christian county. The first permanent settlement in the area now known as Christian county was made in 1818. In 1839 the county was established by legislative action from portions of Shelby, Montgomery, and Sangamon counties and given the name of Dane. Within a year the name was changed to Christian because many of the settlers were from Christian county, Kentucky.

A rather steady increase in the population of the county occurred during the eighty years from 1840 to 1920. A small decrease between 1920 and 1930, and then a small increase, brought the population to a maximum of 38,564 in 1940. Fig. 10 shows population changes from 1820 to 1940 by 10-year intervals.

That the population of Christian county stays at the comparatively high figure of about 35 persons per square mile is to be expected for several reasons: (1) its good geographical location, (2) good highways, (3) good railroad connections with St. Louis, Chicago, and Indianapolis, (4) a good farm-to-market road system, (5) productive soils in a large portion of the county, and (6) employment opportunities offered by the coal-mining industry.

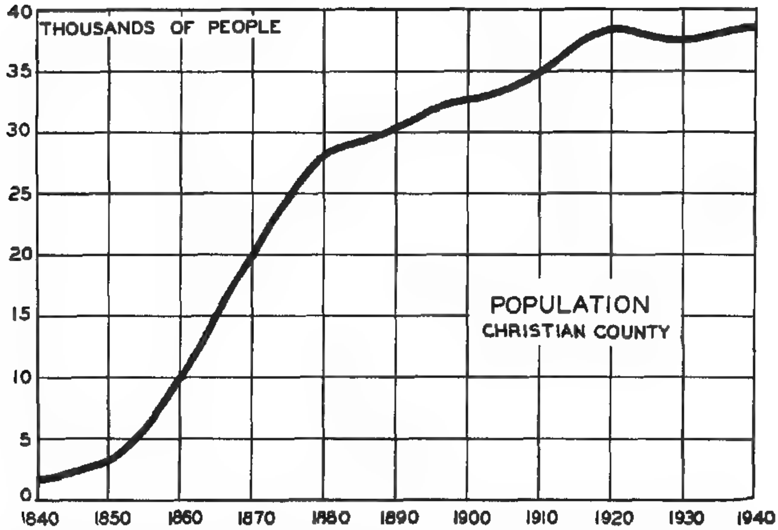
Agricultural production. Christian is an important agricultural county. Corn was the major crop until 1940. Since then the acreage of soybeans has exceeded that of corn. For the fifteen years 1930-1944 the average yearly acreages of the chief crops were:

	Acres
Corn	116,433
Soybeans (threshed)	84,807
Winter wheat	45,353
Oats	31,387
Tame hay	25,200
Sweet clover	8,133
Alfalfa	2,600

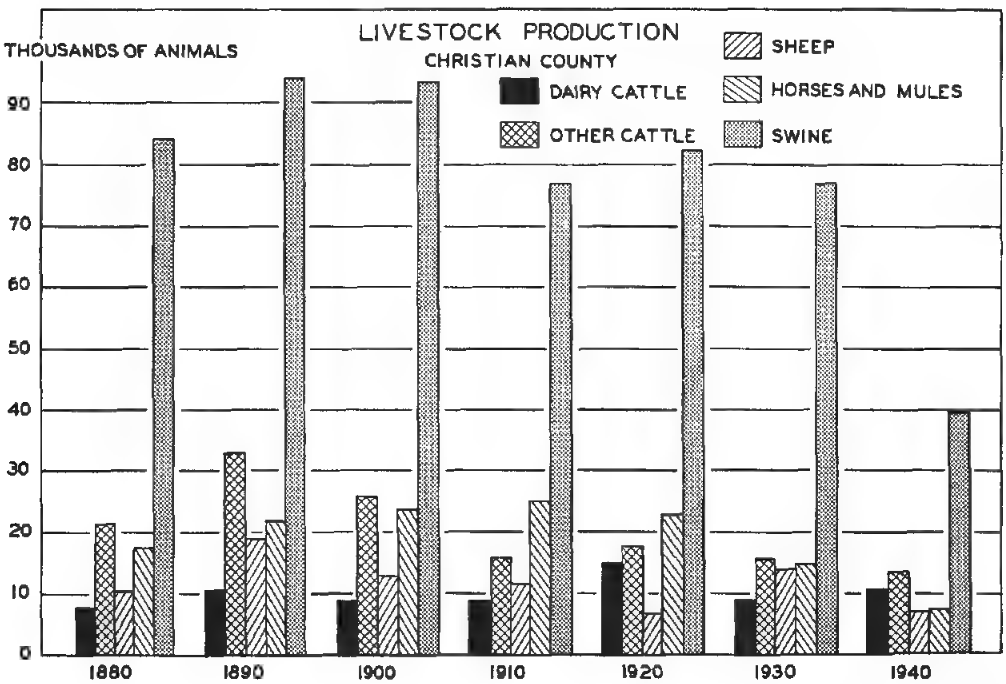
The area of soybeans grown for seed increased rapidly from about 50,000 acres in 1930 to about 150,000 acres in 1944; but the acreage of winter wheat and oats declined considerably and corn showed a slight decline. In 1930 corn was grown on about 130,000 acres and in 1944 on 113,000 acres.

According to the 1945 U. S. Census of Agriculture, there were in Christian county at that time 337,355 acres used for crops, 61,277 acres for pasture exclusive of woodland that was pastured, and 13,854 acres of woodland.

Livestock have been an important source of farm income in Christian county. Fig. 11 shows the numbers of dairy cattle, other cattle, sheep, horses and mules, and swine in the county at ten-year intervals beginning in 1880. Poultry and egg production have also added substantially to farm incomes.



The population of Christian county reached a peak in 1940 (38,564) and, according to the preliminary figures for 1950, it has remained about the same. The previous high point was reached in 1920. This was followed by a slight decline in 1930, but 1940-1950 figures show a rise again to slightly above the 1920 level. Fig. 10



The number of the various classes of livestock has fluctuated less since 1880 in Christian county than in some other counties in Illinois. The steady decline in the number of horses and mules since 1910 and the marked decline in the number of swine between 1930 and 1940 are noteworthy. Fig. 11

MEANINGS OF SOME TECHNICAL TERMS

Alluvial sediment — particles of matter of different size carried by running water and left on the flood plains.

Calcareous — containing enough limestone to effervesce, or bubble, when dilute hydrochloric (muriatic) acid is poured on it.

Claypan — a layer of soil that is sticky and plastic when wet but hard when dry and that is very high in fine clay particles.

Compact — said of soils that are difficult to penetrate, being made up of particles closely packed and sometimes weakly cemented together.

Concretions — small hard nodules, or lumps, of mixed composition, shapes, and coloring. (Limestone concretions and dark rounded pellets of iron-manganese are common.)

Depressional — said of soils that occur in low-lying areas that have either no surface outlets for the water that accumulates or only poorly developed outlets.

Drift — *see* Glacial drift.

Friable — easily crumbled or crushed in the fingers; a desirable physical condition in soils.

Glacial drift — any materials carried by the ice or waters of glaciers and deposited either as layers of particles sorted by size or as mixed materials.

Glacial till — mixed materials deposited by glacial ice and not laid down in layers.

Gumbotil — glacial drift that is strongly leached, fine-textured, highly plastic, and usually dark gray.

Horizon — *see* Soil horizon.

Leached — dissolved and washed out of or down through the soil. This has happened with the more soluble materials, such as limestone.

Leguminous — a term applied to plants that have the power to fix nitrogen from the air through bacteria on their roots.

Loess — fine dust or silty material transported by the wind and deposited on the land. In the Midwest the loess is largely of glacial origin. The grinding action of the glacial ice reduced great quantities of rocks to "rock flour." This fine material was, for the most part, deposited as sediment by glacial streams in their flood stage. Later, during dry periods, it was picked up by the wind and deposited on the surrounding areas.

Manure system — a system of farming which makes use of animal manure, including litter, which is plowed down for corn in amounts equal to the dry weight of grain and roughage removed during the previous rotation.

Neutral — said of soils whose reaction is neither acid nor alkaline.

Outwash, glacial outwash — sediment, often sandy and gravelly, deposited in layers in valleys or on plains by water from a melting ice sheet.

Percent slope — the slant or gradient of a slope stated in percent; for example, a 15-percent slope is a slope that drops 15 feet in 100 feet.

Plastic — said of soils that are capable of being molded or modeled without breaking up; an undesirable condition, the opposite of friable.

Plowsole — a dense, compacted layer of soil just beneath the surface, which interferes with root penetration and the movement of moisture.

Profile — *see* Soil profile.

Residues system — a system of farming in which the cornstalks, grain and soybean straw, second crop of legume hay, and leguminous green manure are plowed under. No animal manure is applied.

Soil horizon — a term used for a natural structural division or layer of soil parallel to the land surface and different in appearance and characteristics from the layers above and below it.

Soil profile — a vertical section of soil through and including all its horizons.

Structure particles — aggregates of soil particles, such as clods, lumps, or granules.

Till — *see* Glacial till.

Topography — the lay of the land surface; as rolling topography, nearly level topography, etc.

Weathered — disintegrated and decomposed by the action of natural elements, such as air, rain, sunlight, freezing, thawing, etc.; said of soils that have been more or less strongly changed physically and chemically and leached.

INDEX TO SOIL TYPES

SOIL REPORTS PUBLISHED

1 Clay, 1911
2 Moultrie, 1911
3 Hardin, 1912
4 Sangamon, 1912
5 LaSalle, 1913
6 Knox, 1913
7 McDonough, 1913
8 Bond, 1913
9 Lake, 1915
10 McLean, 1915
11 Pike, 1915
12 Winnebago, 1916
13 Kankakee, 1916
14 Tazwell, 1916
15 Edgar, 1917
16 Du Page, 1917
17 Kane, 1917
18 Champaign, 1918
19 Peoria, 1921
20 Bureau, 1921
21 McHenry, 1921
*22 Iroquois, 1922
23 DeKalb, 1922
24 Adams, 1922
*25 Livingston, 1923 (replaced by No. 72)
26 Grundy, 1924
27 Hancock, 1924
28 Mason, 1924
29 Mercer, 1925
30 Johnson, 1925
31 Rock Island, 1925
32 Randolph, 1925
33 Saline, 1926
34 Marion, 1926
35 Will, 1926
36 Woodford, 1927
37 Lee, 1927
38 Ogle, 1927
39 Logan, 1927
40 Whiteside, 1928
41 Henry, 1928
42 Morgan, 1928
43 Douglas, 1929
44 Coles, 1929
45 Macon, 1929
46 Edwards, 1930
47 Piatt, 1930
48 Effingham, 1931
49 Wayne, 1931
50 Macoupin, 1931
51 Fulton, 1931
52 Fayette, 1932
53 Calhoun, 1932
*54 Ford, 1933
55 Jackson, 1933
56 Schuyler, 1934
57 Clinton, 1936
58 Washington, 1937
59 Marshall, 1937
60 Putnam, 1937
61 Wabash, 1937
62 Vermilion, 1938
63 St. Clair, 1938
64 Stark, 1939
65 Boone, 1939
66 Shelby, 1939
67 DeWitt, 1940
68 Jasper, 1940
69 Cumberland, 1940
70 Warren, 1941
71 Cass, 1947
72 Livingston, 1949
73 Christian, 1950

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WHAT CROPS WILL GROW BEST ON MY FARM?

WHAT TREATMENT DOES MY SOIL NEED TO MAKE IT YIELD ITS BEST?

WHAT YIELDS CAN I EXPECT?

These are the questions this Soil Report aims to answer for the farmers and landowners of Christian county. Careful reading will repay all who own or operate farms in this county . . . .

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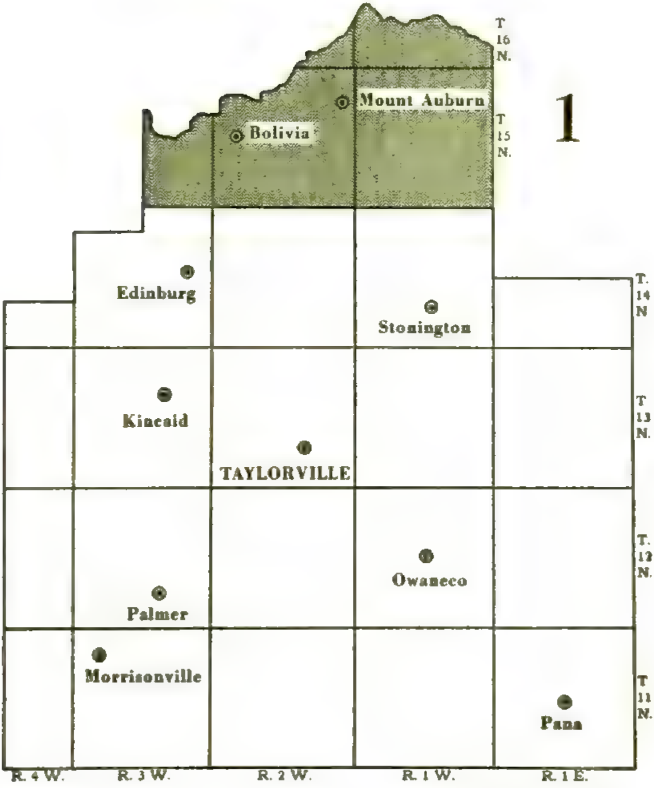
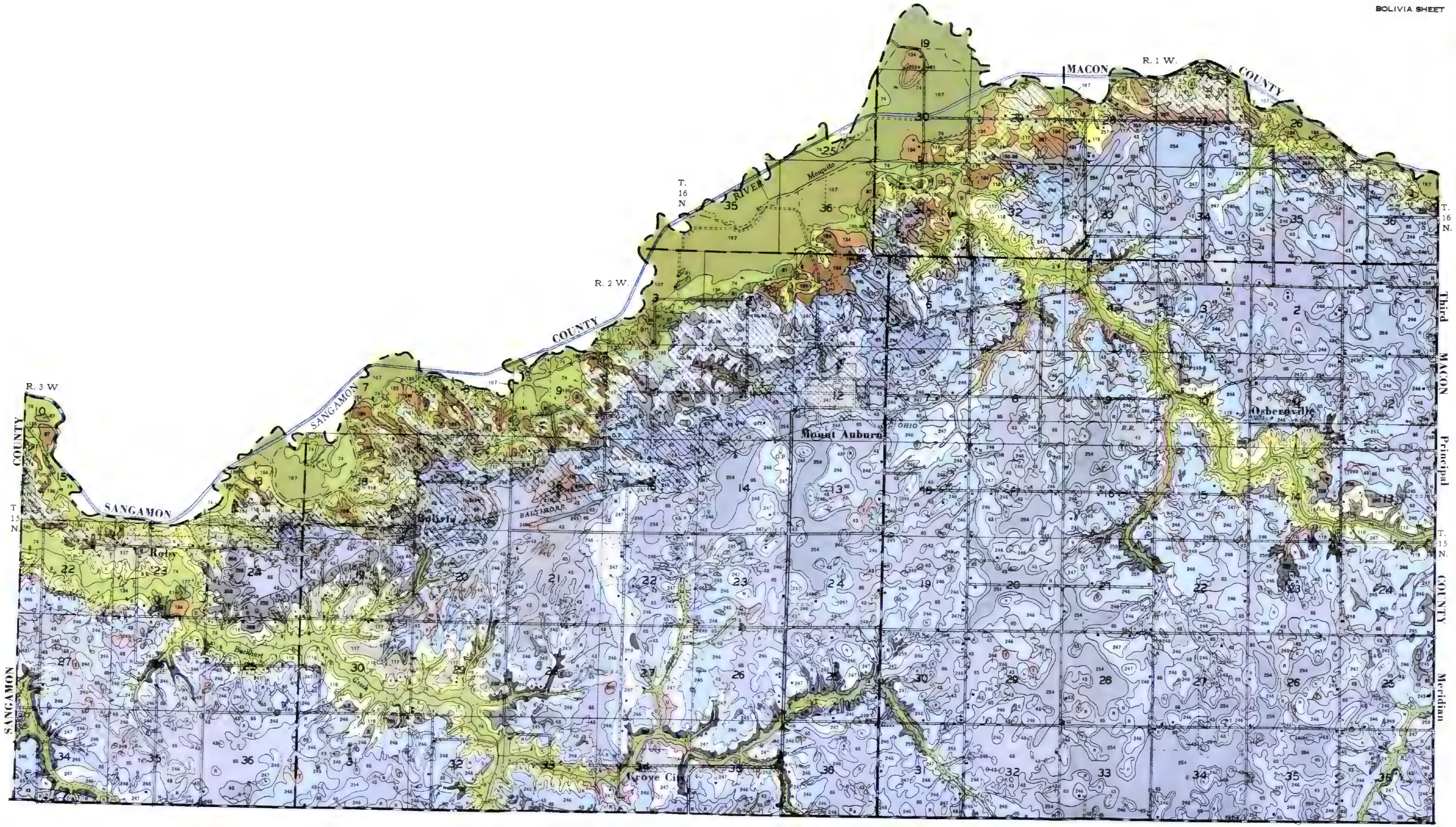


(Christian County Soil Map)

BOLIVIA SHEET



8	Hickory gravelly loam
13	Bluford silt loam
14	Ava silt loam
43	Ipava silt loam
46 B	Herrick silt loam
48 C	Ebbert silt loam
50	Virden silty clay loam
65	Illiopolis silty clay loam
72	Sharon loam, bottom
74	Radford silt loam, bottom
80	Alexis silt loam, terrace
81	Littleton silt loam, terrace
87	Sumner sandy loam, terrace
99 F	Vance silt loam, rolling phase
102	La Hogue loam
107	Sawmill clay loam, bottom
112 G	Cowden silt loam
113 E	Oconee silt loam
116 H	Whitson silt loam
117 J	Bogota silt loam
118 K	Alma silt loam
119 L	Elco silt loam
120 M	Slick spot
127 P	Harrison silt loam
128	Douglas silt loam
134 D	Camden silt loam, terrace
135	Potomac sandy loam, terrace
136	Brooklyn silt loam, terrace
138	Shiloh clay loam
170 Q	Breese silt loam
177	Orio silt loam, terrace
184 Z	Roby fine sandy loam
186	Kincaid fine sandy loam
190-95 I	Onarga fine sandy loam—Hagener loamy fine sand, undifferentiated
95	Hersman clay loam, terrace
245 S	Denny silt loam (45)
246 R	Bolivia silt loam
247 N	Tovey silt loam
249 T	Edinburg silty clay loam
250 U	Velma loam
251-252 V	Owaneco silt loam—Harvel silty clay loam, undifferentiated
253	Stonington loam, terrace
254	Hartsburg silty clay loam (244)
255	Vanderville silt loam
256	Pana silt loam
257 W	Clarksdale silt loam
258 X	Sicily silt loam
259 A	Assumption silt loam
260 Y	Dunkel silt loam
264	Hickory sandy loam
	Underlain by sandy material at 4 to 5 feet

House
School
Church
Filling station, store
Township or Grange hall
Elevator
Cemetery
Railroad (steam)

Paved road (two lane)
Graveled road
Oiled road
Improved dirt road
Secondary dirt and private road
Township boundary line
County boundary line
Levee

Flowing stream
Pond
Swamp
Crossable drainageway
Non-crossable drainageway
M. D. Mine Dump
G. P. Gravel Pit
L. Q. Limestone Quarry

Scale
0 ¼ ½ 1 2 Miles
1946

R. S. Smith, in charge Soil Survey

Soils Surveyed by

Guy D. Smith, in charge
Herman Wascher
R. T. Odell
E. P. Whiteside
J. S. McVickar
C. H. Simonson

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G. W. Buzzard

SOIL SURVEY MAP OF CHRISTIAN COUNTY

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

8	Hickory gravelly loam
13	Bluford silt loam
14	Ava silt loam
43	Ipava silt loam
46 B	Herrick silt loam
48 C	Ebbert silt loam
50	Virden silty clay loam
65	Illiopolis silty clay loam
72	Sharon loam, bottom
74	Radford silt loam, bottom
80	Alexis silt loam, terrace
81	Littleton silt loam, terrace
87	Sumner sandy loam, terrace
99 F	Vance silt loam, rolling phase
102	La Hogue loam
107	Sawmill clay loam, bottom
112 G	Cowden silt loam
113 E	Oconee silt loam
116 H	Whitson silt loam
117 J	Bogota silt loam
118 K	Alma silt loam
119 L	Elco silt loam
120 M	Slick spot
127 P	Harrison silt loam
128	Douglas silt loam
134 D	Camden silt loam, terrace
135	Potomac sandy loam, terrace
136	Brooklyn silt loam, terrace
138	Shiloh clay loam
170 Q	Breese silt loam
177	Orio silt loam, terrace
184 Z	Roby fine sandy loam
186	Kincaid fine sandy loam
190–91 I	Onarga fine sandy loam — Hagener loamy fine sand, undifferentiated
195	Hersman clay loam, terrace
245 S	Denny silt loam (45)
246 R	Bolivia silt loam
247 N	Tovey silt loam
249 T	Edinburg silty clay loam
250 U	Velma loam
251-252 V	Owaneco silt loam — Harvel silty clay loam, undifferentiated
253	Stonington loam, terrace
254	Hartsburg silty clay loam (244)
255	Vanderville silt loam
256	Pana silt loam
257 W	Clarksdale silt loam
258 X	Sicily silt loam
259 A	Assumption silt loam
260 Y	Dunkel silt loam
264	Hickory sandy loam
	Underlain by sandy material at 4 to 5 feet

Scale
0 ¼ ½ 1 2 Miles
1946

R. S. Smith, in charge Soil Survey

Soils Surveyed by
Guy D. Smith, in charge
Herman Wascher
R. T. Odell
E. P. Whiteside
J. S. McVickar
C. H. Simonson

J. B. Fehrenbacher, in charge
Herman Wascher
R. T. Odell
A. E. Erickson
G. W. Buzzard

House
School
Church
Filling station, store
Township or Grange hall
Elevator
Cemetery
Railroad (steam)

Paved road (two lane)
Graveled road
Oiled road
Improved dirt road
Secondary dirt and private road
Township boundary line
County boundary line
Levee

Flowing stream
Pond
Swamp
Crossable drainageway
Non-crossable drainageway
M D Mine Dump
G. P. Gravel Pit
L. Q. Limestone Quarry

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257 W	Clarksdale silt loam
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	Underlain by sandy material at 4 to 5 feet

Scale

0 ¼ ½ 1 2 Miles

1946

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264	Hickory sandy loam
	Underlain by sandy material at 4 to 5 feet

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M. D. Mine Dump
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Scale
0 ¼ ½ 1 2 Miles
1946

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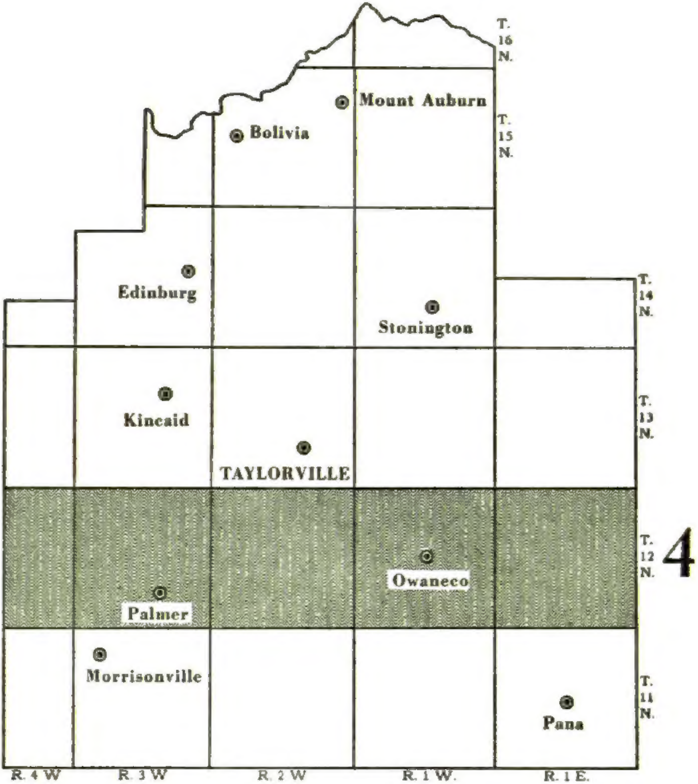
SOIL SURVEY MAP OF CHRISTIAN COUNTY

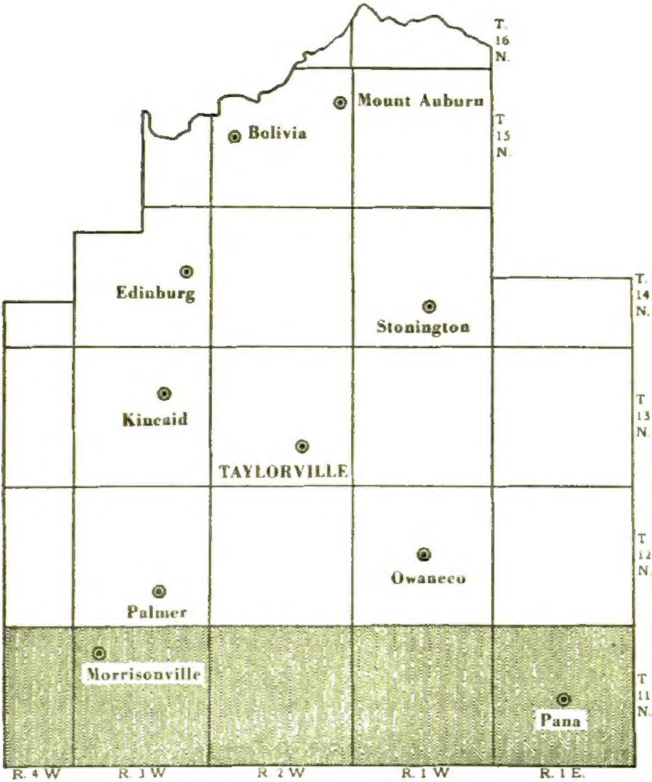
UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

OWANECO SHEET



(Christian County Soil Map)

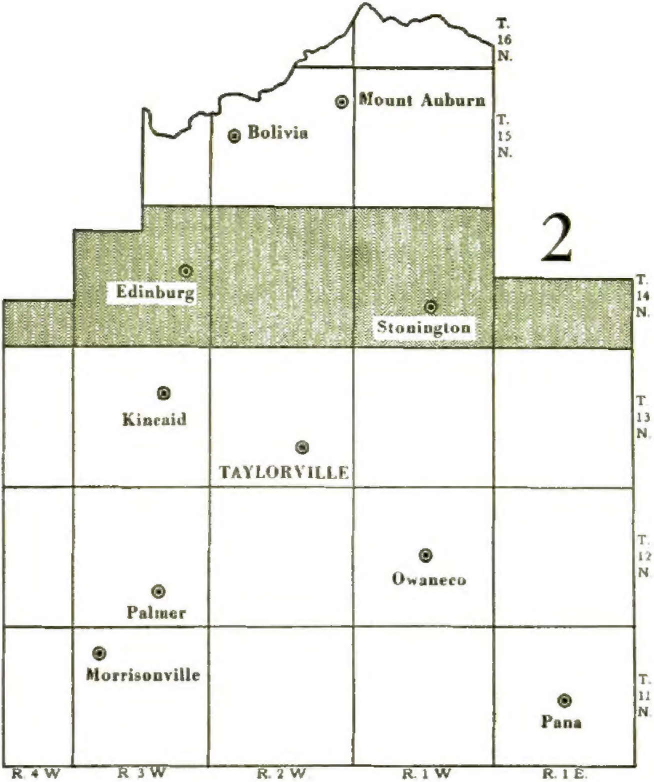
PANA SHEET



5

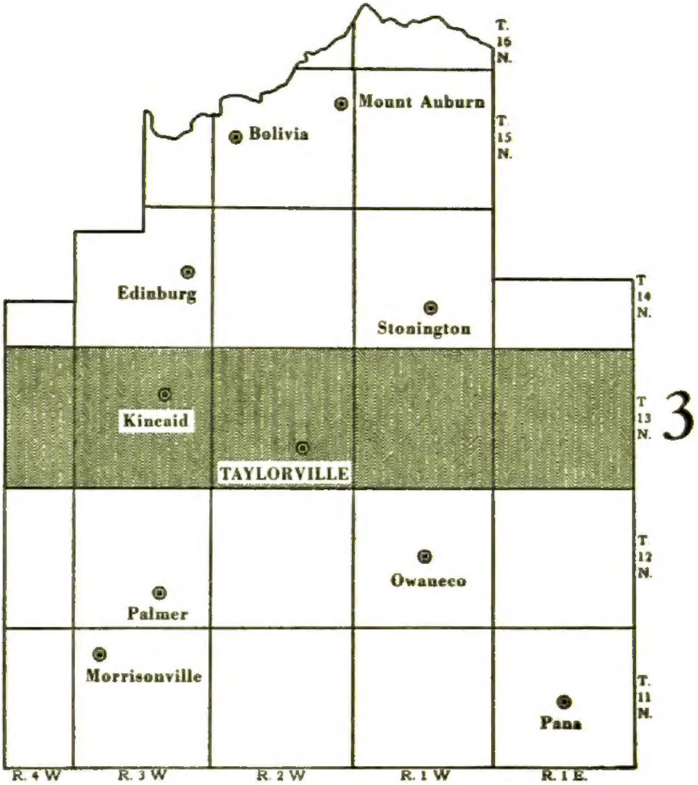
(Christian County Soil Map)

STONINGTON SHEET



(Christian County Soil Map)

TAYLORVILLE SHEET



(Christian County Soil Map)